

Journal of the Royal Society of Arts

NO. 4929

FRIDAY, 9TH JULY, 1954

VOL. CII

THE ROYAL SOCIETY OF ARTS, 1754-1954

Fellows are reminded that the new history of the Society by Mr. Derek Hudson and Mr. Kenneth Luckhurst, the Secretary, is now available and may be obtained from the Secretary by Fellows at the special price of twenty-five shillings; the published price is thirty shillings.

The book contains a foreword by the President, His Royal Highness the Duke of Edinburgh, and an introduction by the Chairman of Council, the Right Honble. the Earl of Radnor.

TWO HUNDREDTH ANNUAL GENERAL MEETING

WEDNESDAY, 30TH JUNE, 1954

THE RIGHT HON. THE EARL OF RADNOR, K.C.V.O., Chairman of the Council,
in the Chair

The Two-Hundredth Annual General Meeting was held on Wednesday, 30th June, 1954, at 3 p.m., at the Society's House, in accordance with the Bye-Laws, for the purpose of receiving the Council's Report and the Financial Statements for 1953, for the election of Officers and for the amendment of Bye-Laws 2, 6, 8, 31, 34, 65, 71, 74, 75 (b), (d) and (e) and 78 (a), and the deletion of Bye-Law 64.

The Secretary read the Notice convening the meeting and proved that it had been duly exhibited and published, as required by the Bye-Laws.

The Minutes of the last Annual General Meeting, held on 1st July, 1953, were taken as read, the Secretary having summarized their contents, and were signed by the Chairman as a correct record.

The Chairman then called upon the Secretary to summarize the Annual Report of the Council:

ANNUAL REPORT OF THE COUNCIL

200th SESSION, 1953-1954

I. HIS ROYAL HIGHNESS THE PRESIDENT

His Royal Highness The Duke of Edinburgh paid his first visit as President to the Society's House on Wednesday, 18th November (a few days before his departure with Her Majesty The Queen on their Commonwealth tour), when he attended the Inaugural Meeting of the 200th Session and presented diplomas to recently appointed Royal Designers for Industry and medals to other recipients. In the course of his Address the President announced the special competition which the Council had decided to arrange in connection with the Bicentenary.

Earlier in the year His Royal Highness had presented the Albert Medal for 1953 to Dr. E. D. Adrian, O.M., P.R.S., at Buckingham Palace.

II. ALBERT MEDAL

With the approval of the President, the Albert Medal for 1954 has been awarded to Sir Ambrose Heal, R.D.I., for services to Industrial Design.

III. SWINEY PRIZE

A joint committee of representatives of the Society and of the Royal College of Physicians has awarded the Swiney Prize for 1954 to Professor G. W. Paton, Vice-Chancellor of the University of Melbourne, for his book *A Textbook of Jurisprudence*.

IV. ROYAL DESIGNERS FOR INDUSTRY

The following new appointments to the Distinction have been made:

William Lyons (*Motor-car design*).

Pinin Farina (*Motor body design*) Honorary Award.

Sir Francis Meynell was elected Master of the Faculty in succession to Mr. Wells Coates, and Mr. Wells Coates served as Deputy Master.

The Faculty held its fourth Annual Reception at the Society's House on 30th June, 1953.

On the occasion of the Society's Bicentenary, the Master presented to the Society on behalf of the Faculty a decorative plate bearing a design by Miss Susie Cooper, R.D.I., and incorporating the greetings of the Faculty. The Master also represented the Faculty at the Bicentenary Banquet.

The Faculty has lost by death one of its members, Mr. Charles Nicholson, R.D.I., the distinguished yacht designer.

Numerous members of the Faculty have again assisted the Society's work by serving on the juries of the Industrial Art Bursaries Competition.

V. THE BICENTENARY

The various forms of celebration so far undertaken to mark the completion of the Society's two hundred years of activity have been attended by great success and marked by a spirit of real enthusiasm. The Council are also very grateful to the Press for the excellent publicity accorded to the Society in connection with the anniversary.

The following are the special activities which have so far been undertaken (in addition to the institution of the Bicentenary Medal reported in Section VI below):

(a) *Week of Celebrations.* The week beginning 22nd March was marked by a series of special functions. These have already been fully reported in a special issue of the *Journal* published on 9th April, and are only summarized here.

On Monday, 22nd March, the actual day of the Bicentenary, a Thanksgiving Service was held in the Church of St. Martin-in-the-Fields, at which the sermon was preached by the Right Reverend the Lord Bishop of Peterborough, and special music was rendered by a choir and orchestra of staff and students of Trinity College of Music under the direction of the Principal, Dr. Greenhouse Allt, a Fellow of the Society. In the afternoon, the Chairman of Council received messages of congratulation from 58 kindred societies, and a closing address was delivered by the Right Honble. Viscount Samuel. In the evening of that day, the Council held a private dinner in the Hall of the Worshipful Company of Tallow Chandlers, at which their ladies were present.

On the afternoons of Tuesday, Wednesday and Thursday, 23rd, 24th and 25th March, a series of three lectures was delivered on the progress of Arts, Manufactures and Commerce during the past two hundred years, by Professor Nikolaus Pevsner, Sir Ben Lockspeiser and Sir Geoffrey Heyworth respectively.

On the evening of Friday, 26th March, Their Royal Highnesses The Duke and Duchess of Gloucester, with other distinguished guests, were present at the Bicentenary Banquet, which was held at the Savoy Hotel.

All these events were very well attended, the number of applications exceeding in each case the number of tickets which it was possible to issue.

On the following Wednesday the Council entertained the Staff to dinner at the Kingsley Hotel.

(b) *Chairman's Badge of Office.* Mr. J. A. Milne, C.B.E., presented to the Society, in commemoration of the Bicentenary, a gold and enamel Badge of Office for the Chairman of Council, which had been designed by Professor R. Y. Goodden, R.D.I. Mr. Milne, who was awarded the Albert Medal in 1940, has been a member of the Council continuously for twenty-five years (since 1934 as a nominee of the President) and was himself its Chairman for the three years 1932-1934.

(c) *Bicentenary Competition: 'Life in A.D. 2000.'* As was mentioned above the Council decided to arrange, as part of the Bicentenary celebrations, a special competition inviting forecasts in literary or visual form of practical aspects of life in the year A.D. 2000. Entrants were required to register by 1st March, and it is expected that about 450 entries will have been received. Judging is about to take place.

(d) *New History of the Society.* A new History of the Society, covering the first two hundred years of its existence, and prepared by Mr. Derek Hudson and the Secretary, was published on 22nd March and was made available for sale to Fellows at the reduced price of 25s. The History was widely and favourably reviewed in the Press.

Commemorative functions were held in Bombay and Hong Kong in connection with the Society's Bicentenary, and the thanks of the Council are extended to the members who so kindly organized them.

The burden of much of the special printing involved in the celebrations was admirably borne by the Society's own press, and the whole of it was designed, on harmonious lines, by Mr. Biggs, a Fellow of the Society.

VI. BICENTENARY MEDAL

As a more permanent commemoration of the Bicentenary, the Council decided to institute a new medal for annual award to those who, 'in a manner other than as industrial designers, have exerted an exceptional influence in promoting the development of art and design in British industry'. The first award of the Medal has been made to Sir Colin Anderson.

VII. EXAMINATIONS

The table of subject entries which follows shows once more a substantial increase over those for the previous year. The total of 154,959 entries constitutes a record, and demonstrates the standard and reputation of the Society's examinations. The previous record was in Session 1948/1949 when there were 154,100 entries, including 11,000 for the Civil Service Proficiency Tests in Shorthand and Typewriting and nearly 40,000 for special establishment examinations for temporary civil servants in various government departments.

			1953-54	1952-53
(a)	Ordinary (Single-subject) Series	... ..	126,767	118,165
(b)	Oral Tests: Foreign Languages	... ..	1,105	1,133
	English for Foreigners	... ..	1,909	1,663
(c)	School Commercial Certificate	... ..	7,445	7,517
	Senior School Commercial Certificate	... ..	2,219	1,417
(d)	London County Council Grouped Course	... ..	4,425	4,090
	Home Counties Grouped Course	... ..	7,340	4,481

(e) Examinations for Employees of Road Transport Undertakings:							
	Scheme "A"	...	...	...	...	20	77
	Scheme "B"	...	...	...	...	1,419	1,666
(f)	Teacher's Certificate in Shorthand	...	...	...	...	648	615
(g)	Teacher's Certificate in Typewriting	...	...	...	...	317	220
(h)	Preliminary examination of candidates under the British Railways Traffic Apprenticeship Schemes	...	...	...	...	999	1,263
(i)	British European Airways (Special examinations in Shorthand and Typewriting)	...	...	...	...	199	221
(j)	Royal Air Force Administrative Apprentices—scheme of endorsement of certificates awarded by the Air Ministry	...	...	...	...	147	142
						154,959	142,670

Associate Membership

Two Silver Medallists at the Society's examinations in 1953, who were eligible for the award of Associate Membership, were elected last autumn.

Examinations in West Africa

Arrangements have once again been made for the Summer Series of examinations to be held at a number of centres in Nigeria, under the control of officials appointed by the Inspector General of Education (Examinations Branch), Lagos. This year there are nearly 3,000 subject entries. In addition, 120 candidates have entered for the School Commercial Certificate and 191 for the Senior School Commercial Certificate examinations; each of these candidates will take from seven to nine subjects.

In future, the arrangements for these examinations will be under the control of the West African Examinations Council.

General Certificate of Education

Last year it was reported that arrangements had been made for the formation of a board to assume responsibility for the conduct of examinations for the award of a General Certificate of Education for pupils of secondary commercial, secondary technical, and secondary modern schools, and in institutions of further education. This has now received the provisional approval of the Minister of Education, subject to the approval of the Secondary School Examinations Council in regard to regulations, subjects of examination, syllabuses, etc. Permanent recognition will not be granted until the examinations have been conducted for a period of years. The title of this new body will be 'The Associated Examining Board for the General Certificate of Education', and the Society's representatives thereon are Dr. R. W. Holland and the Examinations Officer.

A public announcement about the new Board will be made shortly. It is hoped that the regulations, syllabuses, etc., will be ready for distribution in the near future, and that the first examinations will be held in 1955.

Examinations in Road Transport Subjects

In 1951 it was announced that, in view of the diminishing demand, there no longer appeared to be any purpose in continuing with Scheme 'A' of the transport examinations, and that it would be discontinued after 1954; the long notice was necessary to allow candidates who had already begun their studies to complete the three years' course. As was to be expected, very few entries were received for the examinations in Scheme 'A' in this the last year of its existence.

The National Committee on Road Transport Education, which exercises supervision over Scheme 'B' of the transport examinations jointly with the Society, has agreed that in 1955 and subsequent years the present Scheme 'B' shall be renamed 'The R.S.A. Examinations in Road Transport Subjects'. The syllabuses in the various subjects have been revised, and the scheme will in future include an examination in 'Communication and Report Writing'. For many years the examiners have complained of the inability of candidates to express their knowledge in writing, and it is hoped that the introduction of this new subject, which will be an examination in the practice of the English language but with the questions related to matters of interest in the transport industry, will help to overcome this handicap.

Royal Air Force Administrative Apprentices

The R.A.F. Administrative Apprentices Training School has now been moved from St. Athan to Hereford, but the arrangements continue for the endorsement by the Society of certificates awarded by the Royal Air Force. Examinations in Arithmetic and English were held in July and November, 1953, and in March, 1954. Further examinations have been arranged for July, 1954.

Other Examinations

The examinations in connection with the selection of traffic apprentices from the railway staff of the British Transport Commission were held this year in May, when there were 333 candidates each working papers in Geography, General Knowledge, English, and a special paper on Railway Knowledge.

The special examinations in Shorthand and Typewriting for the award of proficiency pay to employees of British European Airways were held in October, 1953, and April, 1954.

The Worshipful Company of Clothworkers has again generously contributed towards the cost of silver and bronze medals.

A fuller report of the Society's examinations during the past year will be published in the *Journal* in the autumn.

VIII. FUND FOR THE PRESERVATION OF ANCIENT COTTAGES

The Council decided to expend the balance remaining in the Fund for the Preservation of Ancient Cottages on some single object appropriate to the

purposes of the Fund, and by arrangement with The National Trust they have in this way carried out a complete overhaul of the roofs of the beautiful and famous cottages in the small village of Chiddingstone, Kent, photographs of which were printed in *The Times* newspaper of 12th March and the *Journal* of 11th June.

IX. OFFER OF ENDOWED PRIZES

As a result of their recent review of the Society's numerous trust funds the Council decided to offer awards, as closely as possible in accordance with the original terms of the endowments, under the Benjamin Shaw, the Fothergill and the Howard Trusts. Entries for the prizes now offered should be in the hands of the Secretary by the 31st July.

X. INDUSTRIAL ART BURSARIES COMPETITION

The Competition held during 1953 was divided into thirteen Sections, for the design of domestic electrical appliances, electric light fittings, domestic gas appliances, domestic solid-fuel-burning appliances, carpets, dress textiles, men's wear fabrics, furnishing textiles, P.V.C. plastics sheeting, 'Perspex' articles, footwear, furniture, and wall-paper respectively; and fourteen bursaries of £150, and four of £75, were awarded to successful candidates. The Sir Frank Warner Memorial Medal was awarded for the best single textile design in the competition, which was submitted in the Furnishing Textiles Section. Candidates were required both to undergo a set test carried out under invigilation, and also to submit with the work done in that test examples of work done by them in the ordinary course of their studies. An illustrated report of the Competition was published, of which a summary was included in the *Journal* of 19th March last, and the usual exhibition of winning and commended designs was held in the Society's House in May. With the Bicentenary of the Society in view, a selection from the designs submitted in the Society's first competitions in the eighteenth century was included in this exhibition. In the autumn of 1953 two exhibitions, both outside London, were arranged of the winning and commended designs submitted in the 1952 Competition: the first was held at the Gray's School of Art, Aberdeen, and the second at the Regional College of Art, Manchester.

Nine bursary winners in the 1953 Competition who were eligible for the award of Associate Membership were elected at the April meeting of the Council.

Twenty-one of the candidates successful in previous competitions made tours abroad during the year. Most of them visited Scandinavia, France or Italy, and other countries visited were Belgium, Holland, Switzerland, and Western Germany; a number of the candidates also undertook courses of study and visited various factories and studios in this country. Details of all these tours and courses were included in the report of the 1953 Competition. Of the winning

candidates in the 1953 Competition, six have already begun their tours on the Continent; and the remainder will be setting out either later this year or in the spring of 1955. Arrangements have also been made for ten of the winning and commended candidates to gain practical experience by visiting factories in this country.

The Council wish to express once again their appreciation of the generous donations from industrial bodies and firms which make this Competition possible, and which encourage the Council and the Bursaries Board in their firm belief that the Competition is of real service to industry and to the cause of industrial design.

The Council has decided to organize a similar Competition during the present year, and to offer Bursaries, of the total value of £2,500, of which £2,331 10s 0d has now been subscribed by industry, for the design of domestic electrical appliances, electric light fittings, domestic gas appliances, domestic solid-fuel-burning appliances, carpets, dress textiles, furnishing textiles, 'Perspex' articles, laminated plastics, footwear, furniture, and wall-paper. In addition to these Bursaries, awards will also be offered under the Bianca Mosca Memorial Trust for the design of women's fashion wear. An announcement of the 1954 Competition was published in the *Journal* of 11th June.

XI. THOMAS GRAY MEMORIAL TRUST

The objects of this Trust, which was founded in 1924, are: 'The advancement of the science of navigation and the scientific and educational interests of the British mercantile marine'.

The following awards were made under the Trust during the session:

Prize for a Deed of Professional Merit

Six submissions were made in connection with the offer of an award of £50 for a deed of outstanding professional merit performed by a member of the British mercantile marine between October, 1952, and September, 1953. The award of £50 was made to Third Officer J. T. Lishman, of the R.F.A. *Black Ranger*.

Prize for an Essay

Eight entries were submitted in the essay competition on the subject of 'The improvement of cargo handling appliances both on board ship and on the quayside; with special reference to the need for self-sufficient arrangements in times of emergency and the overriding consideration of keeping costs low'. The prize of £50 was awarded to Captain F. D. Gardner of the *s.s. Sugar Refiner*.

Prizes for Ships' Apprentices

Fifteen prizes of a total value of £76 18s. 9d. were awarded in connection with the examinations conducted by the Merchant Navy Training Board. The

prizes consisted of five silver medals, five bronze medals and five nautical instruments.

Scholarships for Deck-Boys and Young Seamen

In 1953 the Trust made a grant of £50 for the provision of these scholarships, which are mainly financed by the Trust but administered by the Seafarers' Education Service, and fifteen scholarships were awarded.

Training Ship Prizes

Prizes, to a total value of £30, offered to the training ships *Indefatigable*, *Arethusa* and *Mercury* for the boy in each ship who, in the opinion of his officers, would make the best sailor, were awarded to John Herbert Corbett of *Indefatigable* (£10), George Arthur Everitt and Michael George Edward Brown of *Arethusa* (£5 each), and Anthony Edward Jacobs of *Mercury* (£10). The silver medal offered as a navigation prize in the South African Nautical College *General Botha* was awarded to N. F. Wise.

Extra Master's Certificate Examinations

The Silver Medal offered to the candidate who obtained the highest marks in the Ministry of Transport's Examinations for the Extra Master's Certificate in 1953 has been awarded to Mr. E. C. F. Irvine. The award of the Silver Medal to Mr. A. J. R. Tyrrell last year in connection with the Ministry of Transport's 1952 Examinations was not recorded in the last Annual Report.

Thomas Gray Memorial Bursaries Scheme

As a result of the recommendation made by the Committee in 1953, a three-year scheme has been set up to provide Thomas Gray Memorial Bursaries for cadets training for the Merchant Navy in the Training Establishments H.M.S. *Concey*, H.M.S. *Worcester* and the School of Navigation, Southampton. The object of the scheme is to help cadets whose training is threatened with interruption through financial difficulties. A cadet in each of the first two of the above Training Establishments was awarded a Bursary in 1953 of a value of £50.

XII. SCIENCE AND INDUSTRY COMMITTEE

The Council recently accepted an invitation to the Society from the British Association to join the Association in sponsoring the work of a committee which is investigating, with the aid of a grant from the 'Conditional Aid' funds of the Board of Trade, the reasons for delay in the application of science to industry. Subsequently the Nuffield Foundation also became associated with this work, full details of which were published in the *Journal* for 25th June.

XIII. FILM EVENINGS

A number of very successful Film Evenings were held during the winter months. Four programmes were shown and the attendances on all occasions

were very good. In most cases the directors of the films shown were present to speak a few introductory words.

On 11th March, a few days before the Bicentenary, a special programme of historical films was shown, including *Journey into History*, *The Vital Flame*, *Family Album*, and three of the *Craftsman* series. Among the films shown on the other evenings were: *Persian Story*, *The Moving Spirit*, *Teeth of the Wind*, *Powered Flight*, and *The Heart is Highland*.

XIV. THE LIBRARY

The arrangement and cataloguing of some of the Society's oldest records, particularly early correspondence which was not incorporated in the early guard books, seemed the fittest way of marking the Bicentenary in the Library. Mr. D. G. C. Allan, M.Sc.(Econ.), F.R.Econ.S., has therefore been appointed to work on these papers, and is finding some very interesting material.

The rebinding of the Society's early minute books has also been begun, and that of its collection of older printed books continues. The year's work has been one of preservation of, rather than addition to, the Society's collection; limitations of space may strengthen this tendency in the future. A number of research students have been working on the material available here; much of this is unique or rare, so that the Society has been particularly glad to welcome them.

There has been a slight decrease in the number of books borrowed by Fellows; it is hoped that this will be reversed this year. The Library has been the scene of a number of functions connected with the Bicentenary, small exhibitions, and other of the Society's activities.

XV. THE SOCIETY'S CHRISTMAS CARD

The continued support for the issue of a specially produced Christmas card was shown by the sale of 16,000 cards last year. Many overseas Fellows, in particular, submitted orders for large quantities.

The subject of the 1953 card, chosen in view of the approach of the Bicentenary, was one of the panels by James Barry in the Lecture Hall, in which many of the early members of the Society are depicted, and an identification key was included on the card.

XVI. FINANCE

When, in preparing their Budget for 1952, the Council became aware that the regular items of the Society's expenditure had increased to an amount in excess of its regular income, they decided, in addition to considering possible economies, to take two remedial measures to improve income, viz., to increase slightly the fees charged for all its examinations and to ask the Society to increase the subscription of Fellows elected after July of that year. During 1952 these measures could only have partial effect, so that in the last Annual Report a deficit of £2,067 had to be reported. The benefit, however, of the two changes mentioned

above was felt over the whole twelve months of 1953, and it is satisfactory to be able to report that, owing to them and to other factors, the accounts show an excess of £5,505 of income over expenditure for that year. During the present year it is likely that approximately this amount will be required to meet the special expenditure incurred in connection with the Bicentenary celebrations, but the Council have it in mind to pursue an increasingly active policy in the years ahead and this will only be possible if each year a substantial balance continues to be found after the cost of the Society's regular activities has been met.

XVII. FELLOWSHIP

The number of Fellows on the roll after the June meeting of the Council was 6,099. This represents an increase of 275 over the figure at the same time last year, and the attainment of the new record of 6,000 members, which was reached in March, occurred very appropriately during the month of the Society's Bicentenary.

The special letter which the Chairman addressed to Fellows last October inviting them to submit the names of suitable candidates for election during the Bicentenary year provoked a response from all over the world, and as a result more than 200 new members have been enrolled through these personal recommendations. The Council hope that Fellows will continue to nominate those who they feel will make worthy candidates, and in so doing help to support the valuable work of the Society.

XVIII. OBITUARY

During the past year the Society was grieved by the death of Mr. G. K. Menzies, who had been the untiring Secretary of the Society for over eighteen years, and previously its Assistant Secretary. His great work for the Society was recognized by the award of an Honorary Life Fellowship and of the President's nomination to Council. A full obituary notice appeared in the *Journal* of the 19th March last. Another former Council Member who died during the year was Lord Kenilworth.

Among other obituary notices which have appeared in the *Journal* are those of the Duke of Westminster, who had been a Fellow since 1901, Sir Thomas Taylor, Lord Westwood, Mr. E. Tussaud-Birt (a great-grandson of Mme. Tussaud), Sir Frederick Richmond, Sir Edgar Waterlow, and Mr. Hubert Scott-Paine, the marine aircraft pioneer.

XIX. HONORARY CORRESPONDING MEMBERS

Two additional Honorary Corresponding Members were appointed during the year, viz., Mr. G. W. C. Garrould, of Madras, India, and Mr. C. W. Johnson, of Hong Kong, making a total of eight. The remainder reside in Paris, London (Ontario), Johannesburg, Leichhardt (New South Wales), Calcutta and Stockholm, and their names and full addresses are given in the List of Fellows.

XX. NEW COUNCIL

Five vacancies occur among the Vice-Presidents, through the retirement under the Bye-Laws of Lord Horder, Lord Nathan, Sir John Simonsen, and Sir John Woodhead, and the death of Mr. G. K. Menzies. Dr. R. W. Holland retires from the office of Treasurer, after completion of five years' service. To fill these vacancies Sir Alfred Bossom is proposed as Treasurer, and Professor Sir Charles Dodds, Dr. R. W. Holland, Lord Latham, Mr. O. P. Milne, and Professor Dudley Stamp as Vice-Presidents.

Four Ordinary Members of Council retire under the Bye-Laws, viz., Captain L. G. Garbett, Mr. O. P. Milne, Professor Dudley Stamp, and Miss Anna Zinkeisen. To fill these four vacancies, and the vacancy created by the appointment of Sir Alfred Bossom as Treasurer, the Council put forward the names of Mr. Robin Darwin, the Earl of Halsbury, Mr. William Johnstone, Sir John Simonsen, and Sir John Woodhead.

XXI. STANDING COMMITTEES

A list of those appointed to serve on the various Standing Committees of the Society, and of the Society's representatives on the Governing Bodies and Committees of certain other organizations, was published in the *Journal* for the 27th November, 1953.

XXII. PAPERS AND LECTURES

Several of the lectures for the 200th Session were appropriately concerned with developments during the two hundred years in which the Society has been in existence, and during the Bicentenary week, as is mentioned above, three special lectures were delivered by Professor Nikolaus Pevsner, Sir Ben Lockspeiser and Sir Geoffrey Heyworth. The programme was, however, notable for its forward as well as its backward looks, and two papers of particular interest which fell into this category were read by American lecturers, one of them, on weather modification, by Dr. Irving Krick, who came over specially from America to read it, and the other, on colour television, by Commander C. G. Mayer.

The attendances and publicity which most meetings attracted were very satisfactory.

(NOTE: The references in brackets in the following lists are either to the *Journal* pages or the dates of delivery in those cases where the papers have not yet been published.)

A. ORDINARY MEETINGS

Chairman's Inaugural Address

THE FIRST PRESIDENT. *The Earl of Radnor* (page 9)

Trueman Wood Lecture

RECENT DEVELOPMENTS IN THE STUDY OF THE SENSE ORGANS. *Dr. E. D. Adrian* (17th March)

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ANNUAL REPORT

Peter Le Neve Foster Lecture

THE SOCIETY'S HOUSE: AN ARCHITECTURAL STUDY. *John N. Summerson*
(12th May)

Alfred Bossom Lecture

THE DESIGN OF NEW SCHOOLS. *C. H. Aslin* (19th May)

Percy Smith Memorial Lecture

LETTER DESIGN AND CUTTING FOR TYPE. *Harry G. Carter* (28th April)

Fernhurst Lecture

MODERN DEVELOPMENTS IN FUNGICIDE RESEARCH. *R. W. Marsh* (page 555)

Selwyn Brinton Lecture

THE BRITISH ACADEMY OF ARTS IN ROME. *Ion S. Munro* (page 42)

Thomas Gray Memorial Lecture

SAFETY IN SHIPS. *Captain J. P. Thomson* (page 671)

Bicentenary Lectures

THE ARTS, 1754-1954. *Professor Nikolaus Pevsner* (page 391)

MANUFACTURES, 1754-1954. *Sir Ben Lockspeiser* (page 406)

COMMERCE, 1754-1954. *Sir Geoffrey Heyworth* (page 422)

Papers

KUWAIT. *C. A. P. Southwell* (page 24)

THE SEED CRUSHING INDUSTRY. *Dr. E. G. Woodroffe* (page 77)

THE WORK OF THE WRIGHT BROTHERS FOR AVIATION. *J. Laurence Pritchard*
(page 112)

STEREO-CINEMATOGRAPHY. *Dr. Leslie Knopp* (page 135)

THE DODO AND THE PHOENIX: THE ROYAL COLLEGE OF ART SINCE THE WAR.

Robin Darwin (page 174)

FURNISHING FABRICS OF THE PAST 200 YEARS. *Sir Ernest Goodale* (page 195)

THE SOCIETY'S EARLY DAYS: NEW LIGHT FROM ITS CORRESPONDENCE.

Kenneth W. Luckhurst (page 292)

WEATHER MODIFICATION AND ITS VALUE TO AGRICULTURE AND WATER SUPPLY.

Dr. Irving P. Krick (page 447)

THE EVOLUTION OF PUBLIC HEALTH ENGINEERING. *F. E. Bruce* (page 475)

SHOPS AND SHOPKEEPING THROUGHOUT THE AGES. *Professor A. E. Richardson*
(page 610)

THE CHALLENGE OF RURAL LAND LOSSES. *Dr. G. P. Wibberley* (page 650)

COLOUR TELEVISION. *Commander C. G. Mayer* (5th May)

THE PAINTER AND HIS PUBLIC, 1754-1954. *Bernard Adams* (31st March)

B. COMMONWEALTH SECTION

Nine papers and lectures were delivered to the Commonwealth Section during the Session.

Thomas Holland Memorial Lecture

THE ASCENT OF EVEREST. *Wilfrid Noyce* (page 97)

Neil Matheson McWharrie Lecture

THE DEVELOPMENT OF THE ST. LAWRENCE WATERWAY. *J. F. Grandy* (page 63)

*Henry Morley Lecture*THE COLOMBO PLAN. *A. C. B. Symon* (page 160)*Papers*THE EXPERIMENT OF A STATE MEDICAL SERVICE IN NEW ZEALAND. *Sir Arthur Porritt* (page 573)MINERAL RESOURCES OF THE BRITISH COMMONWEALTH: SOME RECENT DEVELOPMENTS. *R. W. Willett* (11th March)THE METEOROLOGICAL OFFICE AND THE COMMONWEALTH. *Professor O. G. Sutton* (8th April)THE FOREST RESOURCES OF THE COLONIAL TERRITORIES AND THEIR MANAGEMENT. *F. S. Collier* (6th May)ENGINEERING DEVELOPMENTS IN CENTRAL AFRICA. *Sir William Halcrow* (18th May)PROGRESS TOWARDS THE ERADICATION OF LEPROSY FROM THE BRITISH COMMONWEALTH. *Major-General Sir Leonard Rogers* (25th May)

C. CANTOR LECTURES

The following courses were delivered during last Session:

ALLOYS. *G. L. Bailey* (page 227)

SAFETY IN TRANSPORT:

Safety on the Road. *Dr. W. H. Glanville* (page 496)Safety in the Air. *Air-Commodore Sir Vernon Broxton* (page 520)Safety on the Railways. *Lieut.-Colonel G. R. S. Wilson* (page 534)THE CHEMISTRY OF LEATHER. *Dr. Henry Phillips* (17th, 24th and 31st May)

D. DR. MANN JUVENILE LECTURES

Two Juvenile Lectures were given during the Christmas holidays as follows:

SMUGGLERS. *Rupert C. Jarvis* (page 151)INTERNATIONAL SHOW JUMPING. *Lieut.-Colonel H. M. Llewellyn* (6th January)

XXIII. MEDALS FOR PAPERS

The Council have awarded Silver Medals for the Session 1953-1954 to the following lecturers:

For Papers read at Ordinary Meetings

F. E. Bruce

Robin Darwin

Sir Ernest Goodale

Commander C. G. Mayer

C. A. P. Southwell

Dr. G. P. Wibberley

Dr. E. G. Woodroffe

For Papers read at Meetings of the Commonwealth Section

Sir William Halcrow

Sir Arthur Porritt

R. W. Willett

THE CHAIRMAN: You have heard the summary of the main features of the Annual Report from the Secretary. Has anybody got any questions that they want to ask? If not, it is my pleasure and privilege to move the adoption of the Report. I think the Report speaks for itself, and there is little that I need say, beyond the fact that not only did we have during the past year the Bicentenary celebrations, which, I think you will all agree, went very well indeed and gave everybody a great deal of pleasure, but, apart from that, in the ordinary work of the Society we have had a good year. We have attained a record number of Fellows, there has been a record number of examinations, and, in fact, one feels that in our 200th year the Society has gone ahead on the crest of the wave, and I hope it may well remain in that position for many years to come.

I accordingly beg to move the adoption of the Report, and I will ask Mr. Runtz to second that motion.

Mr. E. Munro Runtz having formally seconded the adoption of the Report, the motion that the Report be adopted was put to the meeting and carried unanimously.

The Chairman then called on Mr. P. A. Le Neve Foster to move the adoption of the Accounts for the year ending 31st December, 1953.

MR. LE NEVE FOSTER: In the absence of Dr. Holland, it falls to me to move the adoption of the Accounts. You have all seen them—they have been published—and I do not think there is any very useful comment which I can make. But perhaps there are one or two points to which I might direct your attention.

You will see that subscriptions and registration fees are up a little, that the income from the Examinations Department is up substantially, that the revenue from advertisements in the *Journal* is down a little. On the expenditure side of the Accounts, you will also see that the cost of producing the *Journal* is down, and the other items are much about the same. The net result is that we have got a surplus of £5,505, which I am sure you will agree is very satisfactory.

A treasurer is always supposed to be pessimistic about accounts, and I will therefore run true to form and point out that although we are carrying a very handsome surplus forward we shall also have some expenses to meet. For example there is the cost of the Bicentenary and there will be some repairs to pay for in the Society's House. Although there is a fund to meet the latter item we shall not of course, know until the estimates come in whether it will be large enough. There is also a suggestion about increasing the activities of the Society, and this may well involve a certain amount of additional expense. The Accounts do however show that the Society is in a very healthy condition financially and I have much pleasure in moving their adoption.

MR. PERCY H. SCHWARZSCHILD: Might I be allowed to second the adoption of the Accounts and to congratulate the Treasurer on the satisfactory results? At the same time I should like to raise the question of the future income and expenditure. We have been told in the Report which Mr. Luckhurst has summarized

that although we have a balance of £5,000 much expenditure will be needed during the next twelve months. Now there is one item which I venture to bring to the notice of the Fellows to-day and that is an investment which figures in the Financial Statement published on page 607 of the *Journal*. The first investment there is 3 per cent Savings Bonds, 1955-65, in which we have a holding of over £5,000 now standing at over 100. Surely the Treasurer would be well advised to sell that holding and reinvest the net proceeds in the purchase of 3 per cent Savings Bonds, 1965-75: that would give a ten-year longer life, the dividend dates would be exactly the same, and the result of such a change of investment would be to give the Society approximately an additional £500 on redemption and an additional modest annual yield of income of about £15. I think it would be well if we might suggest that this should be considered when these investments go over par. I am not able to suggest other changes, although we have a holding of Birmingham Corporation 3½ per cent Redeemable Stock which stands now at about par at which price Birmingham Corporation 3½ per cent Redeemable Stock can be purchased. I hope that these suggestions will be considered. I now have much pleasure in seconding the Financial Statement.

THE CHAIRMAN: No doubt the Treasurers will take note of what has been said and will look into it. The adoption of the Accounts has been moved and seconded. Is it your pleasure that they should be adopted?

The motion that the Accounts be adopted, having been put to the meeting, was carried unanimously.

The Chairman then called on Mr. Le Neve Foster to propose a vote of thanks to Dr. Holland, the retiring Senior Treasurer.

MR. LE NEVE FOSTER: The Junior Treasurer is very glad to have this opportunity of proposing a vote of thanks to his retiring colleague. During the last few years Dr. Holland has given up a very great deal of time to the Society, and I am sure the best testimonial of his treasurership is the surplus we are carrying forward. I cannot help thinking that this surplus is very largely due to Dr. Holland's unique qualifications for being a Treasurer of the Society. He is both an educationalist and a business man and he is able to bring to bear on the responsibilities of the office of Treasurer both the shrewdness and wisdom of a very successful businessman and the breadth of vision of an educationalist. He combines with these qualities another very important one of being extremely level-headed. He never gets pessimistic when things are not going quite as they should and on the other hand when everything is going just according to plan he tempers his optimism with a very considerable commonsense. The result of these qualities can be seen, as I have said, in the Accounts, in the very handsome surplus we are carrying forward. I have very great pleasure in proposing a vote of thanks to Dr. Holland.

The vote of thanks was carried unanimously.

The list of nominations having been exhibited in the Library in accordance with the Bye-Laws, and no additional nominations having been made, the Chairman called on the Secretary to announce the new Council for 1954-55, which was done as follows:

PRESIDENT

His Royal Highness The Duke of Edinburgh, K.G.

VICE-PRESIDENTS

Sir Frank Brown, C.I.E.
 *Sir Atul Chatterjee, G.C.I.E., K.C.S.I.
 *Sir Edward Crowe, K.C.M.G.
 Professor Sir Charles Dodds, M.F.O.,
 M.D., F.R.S.
 Sir John Forsdyke, K.C.B.
 John Gloag, Hon.A.R.I.B.A.
 Sir Ernest Goodale, C.B.E., M.C.
 Dame Caroline Haslett, D.B.E.,
 Companion I.E.E.
 R. W. Holland, O.B.E., M.A., M.Sc.,
 LL.D.
 *Sir Harry Lindsay, K.C.I.E., C.B.E.
 Lord Latham, J.P., F.L.A.A., F.C.I.S.
 F. A. Mercer
 *John A. Milne, C.B.E.
 Oswald P. Milne, F.R.I.B.A.
 The Earl of Radnor, K.C.V.O.
 E. M. Rich, C.B.E., F.C.G.I., B.Sc.
 A. R. N. Roberts
 Sir Andrew Rowell, M.A., F.I.A.
 E. Munro Runtz, F.R.I.C.S.
 Sir Harold Saunders, F.C.G.I.,
 B.Sc.(Eng.)
 Sir Selwyn Selwyn-Clarke, K.B.E.,
 C.M.G., M.C., M.D.
 Professor L. Dudley Stamp, C.B.E.,
 D.Lit., D.Sc.
 William Will, C.B.E.
 John G. Wilson, C.B.E.

*Indicates President's Nominee.

ORDINARY MEMBERS OF COUNCIL

F. H. Andrews, O.B.E.
Robin Darcin, Hon.A.R.C.A.
The Earl of Halsbury, F.R.I.C., F.Inst.P.
 A. C. Hartley, C.B.E., B.Sc., F.C.G.I.,
 M.I.C.E., M.I.Mech.E.
 William Johnstone, O.B.E., D.A.
 Sir William Ogg, M.A., Ph.D., F.R.S.E.
 Professor A. E. Richardson, R.A.,
 F.R.I.B.A.
 Gordon Russell, C.B.E., M.C., R.D.I.
 Sir John Simonsen, D.Sc., F.R.I.C.,
 F.R.S.
 Sir Stephen Tallents, K.C.M.G., C.B.,
 C.B.E.
 Sir Griffith Williams, K.B.E., C.B.
 Sir John Woodhead, G.C.I.E., K.C.S.I.

(Ex Officio)

Sir Francis Meynell, R.D.I. (*Master of
 the Faculty of R.D.I.*)

TREASURERS

Sir Alfred Bosson, Bart., F.R.I.B.A.,
 M.P.
 Peter A. Le Neve Foster.

Names in italics are of Fellows newly appointed to their present offices.

The Chairman then proposed certain alterations to the Bye-Laws.

THE CHAIRMAN: The detailed proposals for the suggested alterations to the Bye-Laws were published in the *Journal* on 25th June. At the present moment the Council consists of twenty-four Vice-Presidents and twelve Ordinary Members of Council. The election procedure and the selection of those to retire is partly governed by the Bye-Laws and partly by custom, and in consequence is extremely complicated and quite frequently rather unfair. Your

Council accordingly considered this with considerable care and decided to ask the General Meeting to make material alterations in the Bye-Laws relating to the procedure for election to the Council. It is proposed that henceforth the Vice-Presidents should consist of the present and past Chairmen of the Council of the Society, the Chairman designate, the Master of the Faculty of R.D.I. for the time being, and not more than two other Members of the Council to be nominated by the President. That arrangement will, of course, provide rather an uncertain number, as the total will depend largely on the number of Past-Chairmen who wish to continue as Vice-Presidents of the Society. Instead of the present twelve Ordinary Members of Council, it is now proposed that there should be twenty-four, which is the limit that we are allowed under the Charter. It is important to maintain the principle that in every year there shall be four new Members of the Council, and vacancies for them will normally be provided by the retirement of the two senior Members of the Council, who would accordingly be able to serve for a maximum of seven or so years, and of the two least attenders; that is, least attenders at meetings of the Council only. To effect the change to this smaller Council it is suggested that at the annual election in 1955 only two new Members be nominated for the new Council instead of four and that three instead of two senior Members and three instead of two least attenders of all the Vice-Presidents and Ordinary Members should retire.

Apart from these proposed changes a number of miscellaneous minor alterations to the Bye-Laws are proposed, which I think can be best described as drafting amendments.

Lord Nathan having formally seconded the motion that the Bye-Laws should be altered as proposed in the Journal of 25th June, and no questions having been asked by the meeting, the motion was carried unanimously.

THE CHAIRMAN: It is now my pleasant duty to move a vote of thanks to the staff.

This I do with the very greatest of pleasure. We have a very excellent staff. During the past year during the Bicentenary, in addition to their ordinary duties, they have had a very hard time and they have done exceptionally well. On them has fallen the burden of all the arrangements for the Bicentenary and I have had no fault to find in anything. I have yet to find out about those little difficulties which always crop up and are avoided at the last possible moment with a considerable amount of anxiety on the part of the staff. They have concealed those problems that may have arisen and they have given of their very best in the interests of the Society. There is also, of course, the Examinations staff and, although they had not a great deal to do so far as the arrangements for the Bicentenary were concerned, you will appreciate from the Report that it has been a record year for the number of examination entries and that this has involved obviously a record amount of work for the Examinations Department to carry out: to them also we owe a very great debt of gratitude.

The vote of thanks was carried unanimously.

THE SECRETARY: I do thank you, My Lord Chairman, for this very kind tribute to us on the staff. It is a great privilege that I enjoy to be leader of a real team, and only team-work could have carried us through this past year, but I know that I am speaking for all members of that team when I say that we feel that we are very privileged to have been serving this ancient and honoured Society at such a time. Not only have we at Headquarters had the real thrill of helping to organize the recent celebrations, but there is equal cause for jubilation in the Examinations Department on what is a bumper year for them. Certainly I can speak freely of my colleagues there, as their work is entirely independent, but I do know that the outward signs of their success are the result of the tremendous reliability of all the work that they do and the reputation which they have built up for the Society and its examinations over many years. We do therefore thank you, Sir, for this very kind tribute and assure you that, we feel it a great joy and privilege to be associated with the Society at this time.

MR. MUNRO RUNTZ: It is my enjoyable task to propose a vote of thanks to Lord Radnor for the way he presided this afternoon. I propose to thank him not only, however, for that, but also for his excellent work done during the strenuous times of our Bicentenary celebrations. Whenever he presided he gave us a feeling of pleasure, confidence and satisfaction, and we are indeed grateful to him, as particularly during that time he was not always as well as we might have hoped.

SIR HARRY LINDSAY: I have very great pleasure in seconding this vote of thanks to our Chairman. In all the activities of this Society, a Society so various that it seems to be not one but all societies' epitome, it is no joke being the Chairman, and I am sure you will all agree with me that Lord Radnor has filled the office with the very greatest charm and courtesy. Not only has he been a first-class Chairman but he has endeared himself to the hearts of every Member of Council and every Fellow of the Society. And may I add that Lady Radnor has given him wonderfully effective support in all his responsibilities during the Bicentenary year?

THE CHAIRMAN: Thank you very much indeed for that vote of thanks. I think that as Chairman during the past year I have probably done a good deal less than most Chairmen, than most of my predecessors. For instance there were three months at the end of last year and the beginning of this year when I became particularly lazy. I came back just in time for the Bicentenary and found all the arrangements ready and prepared by my colleagues and particularly by Mr. Runtz who had stood in for me and carried on for me while I was away.

The meeting then ended and tea was served in the Library.

THE CHALLENGE OF RURAL LAND LOSSES

A paper by

G. P. WIBBERLEY, M.Sc., Ph.D., Hon.A.T.P.I.

*Head of the Department of Agricultural Economics,
Wye College (University of London), read to
the Society on Wednesday, 3rd March, 1954,
with Professor L. Dudley Stamp, C.B.E.,
D.Lit., D.Sc., Director, Land Utilization Survey,
in the Chair*

THE CHAIRMAN: One of the great problems of this country is the pressure of population on land resources. There are fifty million of us in England, Wales and Scotland, trying to live on some fifty-six million acres. Ever before us therefore is the question of allocation of land between competing users. We have been forced in the last ten or fifteen years to undertake national planning of town and country. It is a very complex subject with many points of view, and perhaps a lot that has been done has been done through our simply having a hunch, having an idea, and wishing to see it applied.

This afternoon we are to have the very great advantage of hearing a considered view touching on this great problem, and I know that whatever we have from Dr. Wibberley will be good, will be thoughtful, perhaps controversial, may cause agreement or disagreement, but will give us a great deal to think about.

Dr. Wibberley, from his training in this country and in America, has points of view from both sides of the Atlantic. He has served for a number of years as Research Officer in the Ministry of Agriculture attached to the Agricultural Land Service, and has had the control of a fine band of young research workers who, under his guidance, have turned out (unfortunately, for private consumption by the Government departments concerned) a magnificent series of serious studies on our work of land planning.

Dr. Wibberley has recently been 'translated'—I think that perhaps is the word to use—to what is in a certain sense the freer atmosphere of the university world, and he is now head of a department which is striking out along a new line. His department will deal with land economics so little studied in this country, at Wye Agricultural College, under the guidance of the Principal, Dunstan Skilbeck. Wye is the Agricultural College of the University of London.

The following paper was then read:

THE PAPER

The history of land use planning in Great Britain has been sufficiently eventful in recent years to show marked signs of both confusion in and neglect of the

economic aspects of the subject. Underlying all the partisan shouts of different individuals and groups of people interested only in one or a few uses of land, there has been a basic lack of effective balancing of competing claims. There are some who say that widely different uses for pieces of land can only be properly handled by the democratic 'judgment of great minds'. In disputed cases in land use in this country, this is what we pretend to have at the moment—from the case-building and letter-drafting of the lowly executive officers in different Government departments, the minutes and committee meetings of harassed Principals and Assistant Secretaries and the patient sorting out and evaluation of Planning Inspectors at appeal enquiries. These processes have their end in the grinding of the fine but majestic mills of Cabinet wisdom. Some people may say that they have difficulty in recognizing the end product of this sieving and grinding process as being 'the judgment of great minds'. Sometimes their comments on the results are scathing and cynical: 'How on earth did they decide to do that?', or 'If that is planning, give me poker every time'.

The planning or conscious arrangement of land uses has absolutely no justification unless it can be made abundantly clear that the end result is better than the ordinary interplay of supply and demand in the market. There is no real justification for change if the older result whereby a desired piece of land came into the hands of the highest bidder is replaced by a so-called planning mechanism in which the end result seems to be merely the replacement of the highest bidder by the man or interest who has proved the best debater.

THE MISTY HISTORY OF LAND USE

Before we can argue about the best use of rural land in Britain, it is helpful to know how we have used our land in the past and to trace the trends in present-day uses. It is strange, but unfortunately true, that little systematic measuring and cataloguing has been made of the use of Britain's land. If it were not for the maps and reports of the Land Utilization Survey in the 1930s, the records of past use would be very thin. The best coverage is of the detailed agricultural use made of rural land which is compiled from the individual farm returns made by British farmers in June of each year. Useful though these are for showing the changes in the agricultural use of land, they throw only an incomplete light on non-agricultural changes.

The agricultural returns are designed primarily to show changes in the acreage of various crops grown and numbers of livestock kept. Much more care and accuracy in the non-crop areas of farms and between farms will have to be secured before the agricultural returns become also land use returns. It should be possible to do this if the Ministry of Agriculture and other Government departments really put their minds to tackling this gap in our factual knowledge.

It is of course true that ordnance survey maps show the areas covered with buildings of one sort or another but because so many of these maps were out of

date, it has been a monotonous task for local planning authorities in the past few years to get their record of existing buildings accurate, spanning, as they have had to very often, a gap of forty years in many areas.

We do not, therefore, have a continuous annual record of how the major uses of Britain's land surface have changed. We have, in the past fifty years, two pictures only—at two separate points in time—one in the 1930s drawn by the Land Utilization Survey¹, and the other somewhere between 1947 and 1950 which has been done by local planning committees. From these detailed snapshots and the various estimates produced for the Barlow and Scott Committees of enquiry², we are able to build up only the picture shown in Table I of how we in Britain have used and are using our land. The figures are rounded off and this reflects the lack of any detailed accuracy. They are, however, the best I have been able to compile.

TABLE I. URBAN USE OF LAND IN ENGLAND AND WALES

Total area of land—37,136,000 acres

<i>Year</i>	<i>Area under urban use</i>	<i>Percentage under urban use</i>
1925 	3,724,000 acres	10·0
1937 	4,162,000 "	11·2
1939 	4,330,000 "	11·7
1950 	5,020,000 "	13·5
1970 	5,715,000 "	15·4

It is important to explain how these figures have been built up because we cannot discuss future losses of rural land to non-agricultural uses, or their importance, until we are clear and agreed on the past and present situation. The basic estimate is the one constructed for the year 1925. It was produced by the Ministry of Agriculture as part of their evidence to the Barlow Committee. The estimate was re-examined and brought up to date by that same department in 1937 as part of the evidence to the Scott Committee. The breakdown of the 1925 estimate is given in Table II.

During the 1930s the Land Utilization Survey recorded the use of each field in Britain, but, the complete record is not available for the same point in time. In addition, the areas of land covered by non-agricultural development do not provide an accurate enough check on the Ministry of Agriculture's 1925 estimate as the picture of major urban areas produced by the L.U.S. omits non-housing and non-town uses such as the road and rail pattern of the countryside.

TABLE II. LAND USE IN ENGLAND AND WALES IN 1925

	000 acres
Crops and grass returned by occupiers	25,755
Rough grazing land (including rough land grazed in common) ...	5,024
Holdings which escape enumeration	100
Holdings of one acre or less	50
Allotments	163
Total area used for agricultural production	31,092
Swamp or scrub land	94
Waste or derelict	37
Parks not used for grazing	10
Common, heath, moor and rough land not used for grazing ...	230
Prospective building land not yet being developed	13
Recreation grounds, etc., not used for grazing	23
Other land	13
Area not used for agriculture but of potential agricultural value	420
Woods, forests and plantations	1,900
Total of above items	33,412
Total land area (Ordnance Survey)	37,136
Balance not otherwise accounted for	3,724

FUTURE LAND LOSSES*

As estimates of future demands for land incorporate guesses of past and present changes, they can vary from very small to very large figures. We should, therefore, look first at the range of responsible estimates made of the likely uses of rural land for non-agricultural purposes in England and Wales during the twenty years 1950 to 1970.

The lowest is the figure of 357,000 acres given by the Town and Country Planning Association.³ This total covers losses due to town growth only. It does not, therefore, include areas of land to be lost to mineral workings of all kinds, road improvements, aerodromes and defence purposes, and so on. Allowing for these, this estimate can more truly be put at about 500,000 acres.

* Changes in land use between agriculture and forestry are not dealt with in this lecture. The author does not consider such changes as losses, as integration of afforestation and agriculture in Britain can be, and is being, arranged with compensatory benefits.

Professor Dudley Stamp has given a series of estimates based on differing sets of assumptions¹:

- (a) Allowing for the rehousing of half the population, 2,000,000 or 2,250,000 acres according to alternative methods of calculation.
 - (b) Allowing for the rehousing of one third of the population, 1,500,000 or 1,750,000 acres according to the two methods of calculation under (a).
 - (c) Allowing for the rehousing of a quarter of the population, 713,000 acres.
- There has been, and can be, considerable debate about these estimates and about other estimates within this range.

My own study of the problem has led me to accept a figure of around about 700,000 acres²; 500,000 acres of this will be due to town growth, 100,000 acres to mineral workings (allowing for restoration), 20,000 to road works and the remainder to other extensive development. No allowance is made for defence purposes. Future needs in land for defence are impossible to estimate and past experience has shown a large area of land swinging to and from agriculture and defence. In addition, any serious over-estimation in the other types of land loss will be balanced to a great degree by the unknown but probably appreciable future defence needs.

It is possible that this crude total of 700,000 acres will be found to be too high or too low when the analysis now being made by the Ministry of Housing and Local Government of all town and country development plans submitted under the 1947 Town and Country Planning Act is finished. It is very important that the result of this analysis should be made public as soon as possible.

Some may say that even if a crude figure of 700,000 acres is accepted, its agricultural significance is lowered by the use of non-agricultural land for buildings and by the compensation of the production of food in gardens. A sample analysis of town development plans suggests that a minimum of 80 per cent of the land zoned for town development is, or was, *bona fide* agricultural land. Using the results of a survey of 600 gardens in the outskirts of London³ the average housing plot had 14 per cent of its area under market garden type food crops. Applying both of these 'corrections' to the 700,000 acres, we get a lower figure of about 560,000 acres of agricultural land to be lost to non-agricultural purposes between 1950-1970.

SIGNIFICANCE OF THESE LAND LOSSES

No piece of land situated anywhere in the world has one absolute best use. Its use and the value put on that use is, in the last analysis, determined by man, and man shows the relative value of that use by placing a money value on it. There are many people who believe that decisions and judgments on the desirable use of any particular piece of land must not be made entirely by money value: that, if so, it means that some socially desirable uses will be squeezed out. The examples commonly given are the land uses of playing fields, other open spaces, and even housing, which, if money price alone decides, is pushed out from the centres of cities. Again, most food production uses pay a smaller value for land than the majority of non-agricultural uses. £1,000 paid for an acre may mean

a cost of, say, £100 for each house built on it, only a little over 6 per cent of the total cost of the house. Yet £1,000 paid per acre for a food-producing use might carry a rental charge of something like £25 to £30 a year. A gross annual agricultural output* in the region of £200 per acre is necessary to carry a rent of this magnitude and only certain fruit and market garden crops will regularly produce such a high annual figure.

Even though there are many disadvantages in evaluating competing uses for land in units of money, it is difficult to find alternative yardsticks which are really workable. The lack of workable alternatives shows up very plainly in the extensive and confused public discussion which has taken place about the real significance of British land losses. The confusion has arisen mainly from protagonists arguing in different languages. Those concerned with house building and other construction assess the land they want to use in terms of money cost of site works and especially those costs which are extra to what is usual in building work on level land. Thus we get statements like this: 'If site B is used for house building instead of Site A, it will cost £50 more per house'. Yet against this type of estimate in pounds sterling are put the statements that an area of land in agricultural use produces each year so many gallons of milk an acre, so many hundredweight of wheat, oats or barley, a certain tonnage of potatoes, or a certain number of fat cattle or sheep. Even if all these different agricultural products from land are combined in crop-yield indices or, more completely, into calories per acre no final comparison may be made. In addition, extra money cost, to be incurred almost immediately, has to be compared with an agricultural revenue from a parcel of land which the nation only receives in relatively small annual amounts. An example will make this difficulty of comparison clear. Assume that the land use argument involves two alternative sites on which houses could be built which differ in their agricultural value. The planning authority may well be faced with this sort of comparison:

		<i>Site A</i>	<i>Site B</i>
Estimated cost of building each house		£1,400	£1,450
Additional cost of building houses on Site B at			
10 houses to the acre	—		500
Estimated potential agricultural output:			
Milk per acre	300 gals.	200 gals.	
Livestock units kept per acre	0.8 head	0.5 head	
Wheat yield per acre (sustained)	28 cwt.	19 cwt.	

(Calories per acre cannot be set down as these vary too much for any sort of comparison, e.g. potatoes average 5.16 million calories per acre; oats, 1.6 million calories per acre; meat from poor pasture, 0.02 million calories per acre.)

Anyone trying to balance these alternatives, a local planning committee, or planning inspector, for instance, just cannot do it, as the facts are in such different forms. In fact, comparisons of the agricultural productivity of competing

* Gross output is the total value of farm production adjusted for inventory changes.

sites for development are of little real value in land use planning. They can illustrate the fact that there are differences in the agricultural quality of two separate parcels of land and they can show, in a rough way, the relative size of that difference (that is, that Site A is for example about one-third more valuable again as Site B) but they cannot be compared with total or extra costs involved in building on either site. The only way in which they have value is when they are used to give a graphic picture of the replacement job in terms of food which is involved by the growing urbanization of this island. I am thinking here of the broad analyses made by Prof. Stamp in lectures and correspondence to *The Times* where he used the term 'grub stake' in relation to people's personal interest in the food produced off the rural land of this country. I hope he would agree with me that the 'grub stake' type of argument is of no value if it is broken down and used in individual land use cases as it cannot be compared with development costs. It also can be used by persons as a blind argument against any building development whatsoever.

If physical measures of agricultural production are in practice broken reeds in land use decisions, what can we use in their place? The only common language, no matter how imperfect, is that of money cost and return. I am not suggesting that *all* aspects of a disputed land use case can be reduced to a financial yardstick. To say this would ignore the vital though intangible factors of amenity, design and the social needs of individuals and groups and the social fabric of one area as against another. But refusal to compare *any* aspects of important land use disagreements in money terms—and this is what we in this country have been guilty of in the past—makes a mockery of land use planning. Cases for and against a proposed use of land, if they completely ignore land economics, can be like large and highly coloured balloons. They are impressive, they can fly high but how quickly they can collapse when subjected to a pointed argument!

At the outset, there seems to be no practical value in making direct comparison between differences in the annual agricultural money output of two alternative sites and the extra costs involved in building development. A small recurring financial sum is being compared with a large immediate one. At one time I thought that these two sums could be usefully compared if a fair period of years was taken. The period which one could superficially justify is one of 60 years because this period is common to two of the main uses of agricultural land—the rotation period of conifers planted for timber production and that ascribed officially to the 'life' of present day council houses. Thus a seemingly small difference of £10 per acre in annual agricultural production between Sites A and B will total £600 in 60 years and appear to compare quite favourably with the postulated additional development cost of £500. Yet a little thought soon uncovers complications in this sort of comparison. Can we rightly compare an immediate extra site works cost of £500 against a 60 year incremental fund of £600? The present day value of £10 a year over 60 years, say at 3 per cent, is only £276; a lot less than £600. Conversely, if we compare the 60 year agricultural 'difference' of £600 against the value in 60 years' time of an immediate payment of £500, say at 3 per cent per annum, the latter figure swells alarmingly (to nearly

£3,000) and vitates any useful comparison. Dartford and Sims⁷ (after some discussion with me) developed the 60 year 'rotation' concept in another way. They took another purely hypothetical case in which some sloping ground is available for either housing or agriculture and tabulated their figures per acre as follows:

TABLE III

<i>Farming</i>	<i>Cost of raising land to economic cultivation</i>	<i>Agricultural Output over sixty years</i>		
		<i>average per annum</i>	<i>gross total</i>	<i>net total</i>
A. Average site: grade 1-4, land already cultivated	—	32	1,920	1,920
B. Sloping site previously undeveloped	50	25	1,500	1,450
<i>Housing</i> (10 houses/acre)	<i>Building costs per house</i>	<i>Land and site development</i>	<i>Cost total per house</i>	<i>Total per acre £</i>
A. Average flat site ..	1,450	190	1,640	16,400
B. Sloping site	1,550	205	1,755	17,550

They then said 'With regard to the totals in the last column, a simple calculation will reveal that—compared with average conditions—to farm this particular sloping site will entail a 24 per cent loss of output but that to build on it will entail only an 8 per cent increase in cost. So, comparatively, it may be said in this instance that housing would prove the *less* uneconomic alternative.' This is certainly a relative form of comparison. Before it is dismissed on the grounds of complexity of calculation and having no absolute limits, can any other better method of comparison be suggested? I think it can if the problem is approached in a different way.

A FOOD REPLACEMENT YARDSTICK

Anyone who has been actively engaged in decisions on competing uses for rural land in this country must in his heart of hearts have come to these simple conclusions:

- (1) The large bulk of urban development going on in this country is not likely to stop or be stopped and fresh land has to be found for much of it.
- (2) That though there are opportunities for economy in land use in urban spread (which should be taken), they are limited and will not produce

large savings in land area unless very heavy additional expenditure is incurred.

- (3) That alternatives in sites for urban development are, in practice, few in number (quite often non-existent), again unless developers are prepared to incur considerable additional expenditure.

Despite all official pronouncements and edicts of policy made to the contrary, it is these facts which are deciding the broad pattern of land use changes. Instead of pretending that these forces do not exist or of fighting constant small or large rearguard actions against them, we shall do better to admit their existence and their strength. This means that, in addition to the existing machinery for critically examining the densities of proposed urban development and for switching development on to the naturally poorer agricultural land, we should look more to the ways, means and costs, of *replacing* the food now grown on the land which will be used for urban development in the future.

What is the size of this food replacement problem? In the picture given earlier of the various estimates of future land losses, it has been suggested that losses of rural land to urban purposes of all kind between 1950 and 1970 in England and Wales, will be between 560,000 and 700,000 acres. Though the annual rate of loss is not known accurately, it averages between 28,000 and 35,000 acres. If a cross section is made of the types of agricultural land scheduled in town development plans, or that are likely to be used for other purposes such as open cast mineral workings, its average gross agricultural output in 1949-1950 was £34.3 per acre (compared with an average of £27.5 for all enclosed farm land in England and Wales). It can be seen then that even with 'official' agricultural agreement to the use of specific parcels of land for urban development, the quality of land taken was one quarter higher in farm output as compared with the average. Thus for each acre of land in agricultural production which is taken for urban purposes this country loses £34.3 of food products each year. In total, therefore, the food loss, measured in 1949-50 terms, must be somewhere between £960,000 and £1,200,000 each year, and between £19 million and £24 million over the period 1950 to 1970. These figures give us an indication of the size of the food replacement problem which the growing urbanization of Britain is forcing on to us.

I am assuming that this country wants to replace the food now grown on land which will pass out of agriculture. If it does not, it makes a mockery of the agricultural expansion programme now set at a 60 per cent increase on 1938. There are, of course, a wide variety of ways in which this food can be and is being replaced. They range from land saving, land restoration and land upgrading, and to the gaining of 'new' land for all uses through land reclamation. There are many different and separate steps being taken to-day in each of these general fields. We need to look at all of them to see if, as a country, we are keeping some economic balance between the many and various ways of replacing the food lost by urbanization. This means seeking for some yardsticks of costs and returns which can be reasonably quickly and easily applied. As

this is a large and complicated kind of enquiry with many unexplored avenues, all I can do in the remainder of this lecture is to show the lines of argument within it and illustrate them with a few examples. A more thorough and critical assessment of the problem is being made at Wye College (University of London) with the help of American conditional aid funds.

The general discussion may appear weak up to this point in that no account has been taken of possible changes in imports of food or other agricultural commodities into this country. We do not necessarily have to replace the food now grown or acres to be lost to urban growth by food grown on other domestic acres. We could get the deficit from foreign sources, paying for it by the increase in productive capacity and efficiency which planned urban expansion might give. This is not the place to argue the best balance of trade position for Great Britain, but the balance of opinion amongst those who have carefully studied the export markets for manufactures and Britain's ability to pay for imports is that the United Kingdom should, as Professor Robinson puts it⁸, 'develop an economic structure which can, if necessary, be genuinely viable with little more than four-fifths of our pre-war imports'. A balance of trade with reduced imports and more balanced import-export ratio obviously affects our attitude to imports of food, as these made up one-half of the pre-war total of imports. In essence then, we should look carefully at the possibilities of replacing the food area and output lost to urbanization from home resources in agriculture *before* agreeing to increase our food import bill.

Again, it might be argued that we do not have to compensate fully for the food now grown on the land to be lost to urban growth because urbanization stimulates the agricultural use of the remaining rural areas. This would be relevant to the argument of this lecture if the urbanization of this island was accompanied by a development of many new urban communities in sparsely populated and isolated rural areas. Though town growth and planning is certainly showing flexibility, new buildings tend to spring up in the places and localities where the people who demand them now are. For example, though many Birmingham people may well satisfy their housing and other urban needs in the future in communities elsewhere in nearby Warwick and Worcester, they will still be living and eating in the same general area. Therefore it is felt that the benefits of the present form of urbanization whereby existing communities spread out physically are not markedly greater in relation to agriculture than would occur if urban centres developed without taking up more space.

FOOD REPLACEMENT AT THE MARGIN

This country is pouring quite a lot of money into land improvement close to the margin of farming (and of living). This help went first to hill farms under the 1946 Hill Farming Act and, of later years, under the 1951 Livestock Rearing Act, it has been extended down the hillside on to the lower plateaux and broken land of the traditional livestock rearing areas. These areas lack flexibility in the farming uses to which they can be profitably put and they do not normally produce end products for which there are guaranteed markets and minimum

prices. Professor Ellison^a estimates that there are about $2\frac{1}{2}$ million acres of this sort of land (about two-thirds enclosed land and one-third rough grazings) in England and Wales which, with an injection of capital, could give a marked increase in food production. The survey made by the Agricultural Research Council in 1949, on the findings of which policy decisions embodied in the 1951 Livestock Rearing Act were made, suggest that a 70 per cent increase in gross output could be obtained by capital improvements (including interest at 4 per cent) averaging about £40 per acre at 1949-50 prices.

If we were to concentrate on replacing the agricultural output of the land to be lost to urban growth by upgrading this poorer land of the hills and uplands* the rough costs and returns can be compared thus:

Assume annual rate of agricultural land losses to urban	
growth in England and Wales is	35,000
Average gross output in 1949-50 of this land was	£34.3 per acre
	per annum
Average gross output of improvable uplands in 1949-50 was	£12 do.
Increased by 70 per cent (A.R.C. estimate)	£20½ do.
Extra capital required to secure this increase	£40 per acre
Therefore it would take the increased production from—	

$$\frac{34}{20\frac{1}{2} - 12} = 4 \text{ acres of uplands to compensate for 1 acre lost to urban growth.}$$

This will involve the community in a capital investment of £160 or more to secure merely a replacement of the one acre urbanized. Thus, if the country wished to replace from our poorer marginal land all the output lost to continual urban growth, it would face an annual problem of the magnitude of:

$$\frac{35,000 \times 34.3}{20.5 - 12.0} = 140,000 \text{ acres, whose output has to be improved by 70 per cent}$$

and an additional annual capital cost in agriculture of:

$$\frac{35,000 \times 40 \times 34.3}{(20.5 - 12.0)} = £5,600,000$$

This should be compared with the figure of £80 million which is approximately the amount which has been invested in English and Welsh agriculture each year since 1949. If the higher total of accumulated urban land losses between 1950 and 1970 is taken, that is, 700,000 acres, then the food replacement bill in terms of capital invested at the margin, would be at least £112 million—approaching one and a half times the annual investment of new capital in home agriculture. It would also involve more than the $2\frac{1}{2}$ million acres of suitable marginal land said by Professor Ellison to be available.

* There are severe technical and social difficulties in getting this increase in production and particularly in the maintaining of it. For the sake of the main argument, however, I am assuming that such permanent increases are possible at the capital costs quoted.

These high costs and large acreage figures, coupled with the technical and social problems of securing and maintaining such increases in agricultural output on our marginal higher land, point the need for looking at the possibilities of improving the use of other kinds of rural land. There are, for example, the 'problem' areas—some large, some small—on the lowlands, which appear to suffer from major defects outside the control of individual farmers and landlords (such as poor drainage, bad access, farm fragmentation and uneconomic size of holding). To these two main sources, upland marginal land and 'problem'¹⁰ agricultural areas, can be added the possibilities of reclamation from the sea and fuller use of common lands, reclamation of waste industrial land, the elimination of waste pieces in the countryside (derelict and uneconomic woodland and shaws) and the better use of small areas of underdeveloped land on otherwise well farmed and prosperous holdings.

FOOD REPLACEMENT ON THE LOWLANDS

Attempts are being made to bring land of all these categories into a higher state of agricultural productivity, and Government grants—of various sorts—are available for some of these purposes and are being taken up. If it is to cost at least £160 in new capital in the uplands for each acre of land urbanized, can we replace this output more cheaply and satisfactorily by the bringing in or upgrading of these other kinds of underdeveloped land? Following out this line of thought is much more difficult than the mere statement of it. There is a general lack of readily available and comparable information on the costs and returns of agricultural land improvement and reclamation. There are only snippets of information. We hope to be able to discover much more during the three-year research programme now under way at Wye College. Some examples can, however, be given to illustrate the field of enquiry.

The largest loss of agricultural land, next to new housing, is to the open cast working of minerals. It appears that, even if an allowance is made for existing restoration plans, more than 100,000 acres of land will move out of farm production between 1950 and 1970. Restoration costs to full and long-term agricultural use are heavy, representing over £400 per urban acre equivalent, in the case of coal and ironstone mining. It is interesting that a figure of nearly this amount is made available under the 'levy' arrangements for ironstone workings. Thus we as a community appear to be spending more than twice as much money on restoring mineral land to agriculture than we are on upgrading land on the margin of cultivation.

The improvement of agricultural land on the lowlands shows surprisingly light requirements of community capital with good returns in farm output—if we can judge by the rather small and scattered information on costs and returns which is available. For example, comparable capital costs per 'urbanized' acre for war reclamation of two lowland sand land areas work out at under £100 and recent work in the Land's End peninsula gave comparative figures of between £70 and £150. Some coastal reclamation in the Wash and the River Coquet also give comparative capital figures of under £100.

On the urban side of land use, we need to know more of the extra costs involved (in relation to the agricultural output of the land in question) in increasing building densities and the costs of diverting building from good to poor land. These extra building costs need to be related to the differences in agricultural output realized on the sites under consideration. We need to be able to decide whether it would pay us, as a community, to stop urban development on a certain site and to swing it to another more expensive site because it would involve less capital to do this, than to raise the food lost on the better site from agricultural land elsewhere. If, for example, we take the 'replacement' cost figure of £160 to £200 per 'urbanized' acre evolved from our first look at costs and returns from heavier exploitation of the poor uplands in this country, then a gross agricultural output of £34 per acre saved by switching sites justifies an added cost to development of this £160 to £200 per acre. If added buildings costs are considerably higher than this amount then there is an *a priori* case for allowing building development to go on to the cheaper site, though it be the better agricultural land. This is because the community can replace the difference in the agricultural output of the two sites more cheaply by using its capital to increase the output of poorer land elsewhere. Although much more time and analysis has to be given to this concept of the replacement value of land losses, the figures derived from an examination of capital costs in upland farming improvements seem to be in a line with the old development charge, made on land to be used for building in Great Britain up to 1952. A study of a sample of charges made on developers by the Central Land Board on plots changing use for house building on the fringes of towns gives a wide range of figures but the mode of the range lies within £250 to £400 per acre. In other words, there has been some affinity between what is in practice paid above the existing agricultural value of fringe land to towns for house plots and the amount of capital necessary to be sunk in our poor farming areas to increase their production.

SUMMARY

In conclusion, may I attempt to summarize the argument of this paper and the field of enquiry which we hope, in the University of London, to cover in the next few years.

1. Physical Land use planning in Great Britain, as it is now operated, has two major weaknesses:
 - (a) Lack of knowledge of how major land uses are changing, both in total and in the character and quality of the land changing in use.
 - (b) Those needing land for different major uses are arguing in terms which cannot be readily compared. Financial and economic terms are the only ones which can be used as a common denominator.
2. It is suggested that the approach which has real possibilities of constructive action—rather than of defensive stone walling—is the concept of the food 'replacement' value of the agricultural land lost to urban growth.
3. Examples have been given of the costs involved in securing this 'replacement'

value from poor upland areas, restoration of mineral workings and the up-grading and reclamation of pieces of land in the lowlands. Comparison can also be made with the extra costs of developing awkward and poorer sites for building.

4. Much more evidence needs to be collected about actual and probable costs and returns to agriculture of the major alternatives in land saving, land restoration, land upgrading and the bringing in of new land. Specimen costs and returns already collected suggest that many facets of our urban and rural land policies do not make economic sense.
5. The ultimate object of further enquiries into this 'food replacement' concept is to construct yardsticks which can be used to sort out the economic merit of future major land use arguments in this country. These cover, for example, alternative sites for major urban developments, the judgment of derelict land possibilities, the justification of the restoration of opencast mineral workings, the evaluation of schemes of coastal land reclamation, the assessment of hill and marginal land policies and, lastly, the arguments for or against open and tight building densities.

In the physical planning of land use in Britain a comprehensive legal and administrative structure has been built up. Yet insufficient critical thought has been given to tests of the worth of this structure. In particular, the significance of the continual loss of agricultural land to non agricultural purposes has been dealt with only in physical terms. This lecture represents an attempt to suggest another type of critical approach to the problems of land saving and land spending in Britain.

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DISCUSSION

THE CHAIRMAN: I think you will agree that, as I suggested in introducing the lecturer, we have certainly heard from his lips something worth-while. He has developed a closely reasoned argument, and I know by your attention that you have been doing your best, as I have been doing my best, to follow his argument. Many of us feel that we shall benefit greatly from reading this paper when it is published, as it is difficult to grasp mentally the figures which he has given us in the course of the last hour.

MR. J. R. JAMES (Ministry of Housing and Local Government): My colleagues and I deeply appreciated Dr. Wibberley's work when he was with the Ministry of Agriculture and we regretted his departure in the new year; but it is evident from the reasoned argument we have just heard that his work in the University of London will continue to have high value for us all. I am glad that he has so quickly used his new-found freedom to put his ideas so clearly before us.

The extraction of information from Development Plans is a long process, but it is going on and it will soon be possible to say what the various land use proposals add up to. My personal view is that an estimate of agricultural land loss of 700,000 acres over the next twenty years is too high and that a figure of about 400,000 acres will be much closer to the truth. Whatever the figure, it does not invalidate the line of thought which Dr. Wibberley has put forward. What does matter is that we should view this change of use as an inevitable consequence of the need to give better living conditions to people in urban areas and that we should try to replace this loss of food-bearing land by stepping up production on our remaining land in the most appropriate places.

On a triviality I should say that Dr. Wibberley was not quite right in taking away the 14 per cent which goes to garden cultivation for vegetables and soft fruit from his figure for agricultural land loss. Dr. Wibberley is talking about food replacement, and the amount of foodstuffs grown on that 14 per cent is very much more than the amount of foodstuffs which would come from an equivalent acreage of agricultural land. But like the earlier point this matter does not impair the validity of the theme which has been put before us.

THE LECTURER: It is perfectly true that what has come out in this lecture is not just the effect of two months with the University of London. Past colleagues of mine in the Ministry of Agriculture and the Ministry of Housing and Local Government have been thinking in this way for some time, and I am extremely grateful to them for ideas and factual evidence.

I cannot agree with Mr. James that these estimates of land losses are unimportant. We in agriculture need to know the likely future demands of urban areas for land—we should like to know them from year to year—because it then gives agriculture a picture of its food replacement problems. The Ministry of Agriculture has an agricultural expansion problem. It wants to know how much it will have to increase its production in order to get a net increase in overall food supplies, because a certain part of its improvement programme is taken up through the effect of urban land losses.

New light should be shed on this controversial garden question, because the Ministry of Agriculture and the Ministry of Housing and Local Government are making a survey of the use of gardens for food production in five county boroughs in this country, which will, I hope, check whether the pilot survey done by Mr. Mackintosh and me around London did produce the right results. I am glad that Mr. James believes that this garden controversy does not invalidate the line of argument developed in my lecture.

SIR WALTER GURNER, C.S.I.: I should like to ask Dr. Wibberley if he has any comment on a feature of the Development Plan which is beginning to worry the Council for the Preservation of Rural England, to which I belong. That is that there is no specific designation in the plan, as I understand it, for agricultural land. There is a colour for residential areas, a colour for open spaces and so on, but the rest, including agricultural land, is shown as white in the common pool. That sounds good enough, but what is beginning to happen in practice is that the local authorities, under pressure of this demand for housing, are beginning to say, 'Yes, that is shown on the Development Plan as white; but that just means nothing at all, it means its use is not pre-determined'. There is one particular case, I think in Sheffield, in which,

at the public inquiry, the Council stepped into an admission that this meant it should not be used for residential purposes without a change in the plan. But that is quite uncommon, and there is undoubtedly a tendency to interpret this nondescript white as land which may be used for residential purposes instead of agriculture, should the local authority so decide.

THE LECTURER: I do agree that this occurrence arises from a basic weakness in the approach to land planning in this country. Agricultural land is looked upon as a residual: it is the white area from which land is taken for other purposes.

I hope that the research work being developed at Wye College may give us some measure of what that white land around any particular town is really worth to the nation; in other words, what the community will be faced with merely to replace the food that is now grown on it if it is taken for urban purposes. We hope to give some thought to simple yardsticks which can be applied to major problems. I do not know whether we shall get into severe difficulties with these yardsticks, and even if they are produced, so that we can measure the relative work of different areas of land and of different land policies in relation to capital resources, we are without the administrative or legal framework in this country for applying them. But this is a secondary thing, and I only hope that our administrative colleagues will be very happy quickly to make the necessary changes.

MR. J. F. Q. SWITZER: As a member of the Cambridge school, I find it most satisfying to hear the lecturer's emphasis on the scientific attitude to the planning of land use, particularly where losses of agricultural land are concerned, rather than what we look upon as the rather biased attitude of the Majority Scott Report. I believe that his new yardstick for land use planners is a development of the greatest importance.

MR. T. F. THOMSON (County Planning Officer, Hampshire County Council): I should like to draw attention to the wording of Section 1 of the 1943 Planning Act which was that the Minister was charged with the duty of securing consistency and continuity in the framing and execution of a national policy for the use and development of land. Town and country planners have for many years been continuously concerned with the creation of a suitable environment for the people of this country to live in. This point of consistency and continuity is a thing which I think is given too little attention. They mean, as I understand them, the carrying on of the British tradition. We have done our best, in a country which has ideals to live up to, to produce better living conditions. I want to suggest that the policy of continuity and consistency is not so evident in the use of agricultural land and its development for agriculture. It has been evident in the case of the Forestry Commission, faced with similar problems in producing more timber in this country to meet the needs of the nation against foreign competition. I must say I am greatly impressed by the way in which the Commission is tackling this problem. I do not think that the Ministry of Agriculture has in any way faced up to the great need for increased food production in this country by increasing gross productivity. They have endeavoured, by rear-guard action, to prevent land being used for housing, thereby worsening the living conditions of the people of this country. What they have not done is to increase sufficiently the productivity of this country—and heaven knows it does need increasing—under the machinery available in the Agriculture Act for that purpose. I submit that these powers have not been used to anything like the extent they should have been used.

THE LECTURER: May I defend my old Ministry? It always seems to me that if we are going to have consistency and continuity in the planning of land use one organization should be responsible for it and this should really handle all major policy aspects. It is surprising that the Ministry of Town and Country Planning,

as it was then, and other responsible bodies dealing with town and country planning should not have quickly looked at all sides of the land loss problem and tried to work out where the balance of the advantages lay. I am talking to-day about the food replacement problem; surely that was also the problem in 1947? A Ministry of Town and Country Planning should be a real central authority; it should very quickly have gone into this whole question of what we can afford to do in various ways with our land resources. The Ministry of Agriculture should not have been allowed to be placed in a position where it was the one fighter on behalf of agricultural land. I have always felt that this was an unfair position for any Ministry to be placed in, because, with the best will in the world, there are bound to be disagreements, and if an official becomes an official protagonist for one point of view it is very easy for him and for some of his colleagues to become mentally blind. I would pin the entire responsibility on to one co-ordinating body or Ministry. This, after all, was the conception of the Scott Committee. The idea was translated into a Ministry of Town and Country Planning, and this early Ministry merely shirked a number of the basic issues dealing with agricultural land and rural land.

MR. F. J. OSBORN (Chairman of Executive, Town and Country Planning Association): I have greatly appreciated Dr. Wibberley's very balanced and carefully reasoned address. I have often sympathized with him when he was in the Ministry of Agriculture because I could see that he was a far more intelligent man than the statements he was allowed to make at that time would have indicated. I do not know why land 'losses' and land 'saving' are always used. Surely it is a transfer of land from one purpose to another, and I deplore the very use of the word 'losses'—which perhaps indicates that, under present conditions, I take the urban point of view in this controversy. Although I am slightly mollified by Dr. Wibberley's paper, I am in a state of moral and scientific indignation at the gross exaggeration of the situation with regard to agricultural land and food production, because it has, in my opinion, done incalculable harm to town and country planning in this country and to the living conditions of its workers. I know of cases where housing schemes are being projected, and are in danger of being passed unless Dr. Wibberley's new accent is very quickly spread, at something like 22 to 25 houses per acre, even in rural areas. When you recall that we had on the Statute book between the wars an urban maximum density of 12 houses an acre and an agricultural maximum of 8 houses per acre, you can see the degeneration in the living standards of the people, brought about by the exaggeration of the danger of the use of land for other purposes than agriculture.

This scare campaign that I speak of has produced an impression still held by many people in this country, that we are losing 50,000 acres a year at least to urban purposes, and that we are going to lose anything up to two or three millions in the next twenty years. Yet, as Dr. Wibberley has reminded us, the difference between 500,000 acres—which was my estimate—and his estimate, which is 700,000 acres, is absolutely negligible in relation to the food supply of this country. We are making a horrible mistake by increasing our urban density under this pressure.

I do not know what Dr. Wibberley was thinking of when he talked about stopping anybody raising the subject of produce from gardens; I am very keen on this point, and I have put up again and again unanswerable arguments on the absurdity of cutting out from the gardens just that part which can produce food. If the density is increased from something between 15 and 12 houses to an acre to something between 18 and 20 an acre, it is practically impossible to produce any food from the gardens at all. It is this marginal difference that constitutes the land we can really save. If you build flats you can effect a slight saving of land: with 30 to 35 flats to the acre instead of 15 houses to the acre, 380 acres are saved for every 10,000 dwellings put up, but the extra cost of the flats is £11 million. Thus it costs £30,000

for every acre of land saved by that method, and that is a useful figure to bear in mind in relation to the cost of the improvements of farm land which Dr. Wibberley has quoted. In addition, if a garden produces on an average food to the value of two shillings a week, that corresponds to something over £60 a year per acre, which would be a very high yield from average farming land generally used for house building.

It is most important, I think, that we should bear these economic factors in mind. I agree very strongly with Dr. Wibberley that we must return to some conception of the economic merits of the various alternative proposals that we have in view for the use of land. Yet I hope he will not press it too far. I think it could go too far, because I am just as keen as anybody on the preservation of the greater part of our agricultural land in this country, both for the sake of agriculture and for the sake of the amenities of the towns themselves and of the amenities of the whole country. We do not want the whole of the land to be under the threat of use for sporadic building just because that would be financially the best use for it in the market. I do not think Dr. Wibberley would want to carry it as far as that.

THE LECTURER: It is very nice to know that I am a reformed character, even if I have never had that feeling of being unreformed, though it has obviously impressed Mr. Osborn that way. I felt at Nottingham, for example, when I gave a long paper there to the Town and Country Planning Summer School, that the mark of the civil servant was not too strongly on me. I am not going to flog this garden argument because it has become very much the interest of Mr. Osborn, especially over the past three years. Mr. Mackintosh and I made an early survey of 600 gardens around London. We were somewhat doubtful about publishing it and emphasized the pilot nature of the study and of the findings. Ever since, we have noticed people drawing different conclusions from it to justify particular points of view. Sometimes Mr. Mackintosh and I wished we had never touched the subject. I would suggest that the argument be left alone for three or four months until the combined study being made by the Ministries of Housing and Local Government and Agriculture, in many different towns and on different types of land, is published. Then we might have a more scientific basis on which people are to continue the building.

More seriously, I am glad that Mr. Osborn has warned me not to push this economic argument too far. I am alive to this and it is the reason why I emphasized at the end of the lecture that this economic approach should be combined together with analysis of amenity, design and of social factors, so that all four together can make our planning machinery more rational and more effective. I think we have been very weak up to the present in the way in which we have neglected the economic factor and over-emphasized some of the others.

MISS J. ADBURGHAM: It seems to me that it does not matter how much land we mark as red for development on the development maps, or how much we leave in the white, the nebulous area where you can take your luck and draw a ticket with either 'agriculture' or 'development' on it. The whole thing, as I see it, is this: when you have 'saved' your land or have prevented the loss of your land to agriculture, how are you going to guarantee that you are going to get any productivity from it unless you have some manpower to work the land? It can lie fallow for years because we have not got the strength to work it. I think that is one of the economic calculations on which Dr. Wibberley did not touch, and that it is the most material.

It seems to me that what is needed is some kind of planning which plants population in the county agricultural areas and which creates new colonies of people, among whose rising generations will be children tempted to work on the land. The tendency now is to bottle everybody up in new towns, old towns, existing villages and all the rest of it, and put a boundary round the place and say, 'In that you have got to congest yourselves, and outside we are going to run agriculture for all we are worth'.

What we must do is to secure a proper ratio between land set aside for farming use and the strength of the farming community in each county.

MR. R. W. DALE: I am very glad that Dr. Wibberley has brought this subject into its proper scale. The whole question here has been out of scale for so long. At the moment I am in the throes of inquiring into a development plan, and for that reason I have had to get out some figures. One or two things which I extracted from the agricultural statistics for our county surprised me. For instance I noticed that in the course of years, the total area under crops fluctuates considerably. Where it goes when it goes out of production I do not know, but according to my calculations the total land that we will need to replace in the next twenty years is about one third of the variation in the total acreage of crops over a period of about ten or twelve years. The crops in the county go up and down three times as much as the total that we want for everything in the next twenty years. I think that this needs some explanation.

Whenever I think about this problem it always seems to come back to intensity. I am not at all sure that the answer is marginal land reclamation or anything else. I am not sure that, as it is suggested, the cheapest and quickest way of replacement is to step up intensity in the lagging areas. Everybody who knows the average British county knows that the difference between a good and a bad farm is enormous. If we can only get intensity all over, if we can only raise the standards, it will be the quickest and probably the cheapest way of recovering any food we may have lost.

One other point: I find people inclined to laugh at it, but I think it is rather important in my particular county. The horse population on agricultural land in 1922 was over 39,000. It is less than 9,000 now. That is a drop of 30,000 horses. I believe a horse is called a four-acre animal; allowing for some of them being young and not wanting to eat so much I took $3\frac{1}{2}$ acres a horse. We have picked up an equivalent of over 100,000 acres which were used to feed horses and can now feed humans.

One final word: I am sorry to talk about gardens, but may I make an appeal to Dr. Wibberley. He has influence on the people who are going to carry out research into these five county boroughs. Why always concentrate on county boroughs when you are dealing with gardens? They are the places where, for several generations, people have been divorced from rural life, and have probably less ability to use gardens than anywhere else on earth. Why not get at least half of the research into our many country towns and market towns where you will see how gardens can be used?

MR. A. R. HYDE: I think the lecturer said that it was no use substituting for the highest bidder a system of allotting land according to the best debater. But is it not possible that, if the highest bidder tends to be the financial exploiter, and the best debater tends to be a man who has national, and not merely financial, interests at heart, the latter system is to be preferred to the former?

THE LECTURER: First of all, Miss Adburgham's remarks: I know of no way, either in town planning or in rural planning, whereby the actual scheduling of a proposed use is automatically followed by the carrying out of that use. This is true in farming. Even if a piece of land is left for agriculture, whether or not it is farmed, or whether or not it is farmed intensively, depends on many other factors. Yet surely we have the same problem in the blighted areas of cities? We can say what we want to have in them. Whether or not we get them is another matter.

I completely agree with her about the concept of dovetailing rural and urban prosperity by getting new urban development into our sparsely populated and isolated rural areas. There are quite a number of important people in the planning field who are pressing for it. There are a tremendous number of difficulties, and at

the moment I think there is rather a swing back to the older type of planning arrangement whereby provision is made for people in the places in which they already live. My only hope is that the latest experiment of the L.C.C. and arrangements under the Town Development Act will be allowed to go on and will succeed.

Mr. Dale and I will have to have a private chat some time about statistical records in agriculture. They are rather poor, and many of the results he was getting were due to the imperfections of the statistical arrangements, especially in their coverage of smallholdings and plots of land attached to houses. During the war I made a study in the county of East Sussex in which we were surveying all the farms 'officially' in that county in 1939. At the end of 1944 we had surveyed 130 per cent of the farms 'officially' in existence and we were still finding odd pieces of unrecorded land.

Of course, this variation in farming efficiency is very important. I did not touch on it because there is a lot of work and study being done on the problem, and I am in an organization working towards improved farm efficiency. All I have tried to stress is that we ought to look at the various land policies we have in Britain at the moment, particularly those to which the State is contributing money, to see if they can be evaluated with the object of securing a better relationship between costs and returns than exists at the moment.

As to his garden question, there is one thing worth saying: when we looked at this garden controversy and saw all the factors which could be brought into it, it appeared to us to be important to check one or two relationships at a time, holding every other factor constant. In the present survey of five county boroughs, the two Ministries are trying to see what is the exact relationship between the amount of area in food crops in the gardens as plot sizes go up or down with every other factor held constant.

I am intrigued by Mr. Hyde's remark. I rather doubt what he has said, because I found myself in one particular case arguing the agricultural case on the disputed land use problem and losing it. Three months later the case was reviewed and because I had thought up some other evidence and arguments I won the same case hands down. This made me wonder, as in second review I was in extremely good debating form; the best debater had won. This seems to me a shocking way of handling important land use cases, yet it is bound to occur in the absence of more rational and impersonal tools of analysis and measurement.

THE CHAIRMAN: Normally, we do not on these occasions have a formal vote of thanks, and so I should like to express our appreciation for a most instructive afternoon. There are certain things which Dr. Wibberley has brought out almost unconsciously. I put first the point which I personally have raised so many times: our lack of knowledge. How little we really know when it comes down to it, and how much we build on the little we know! I think it a very salutary thing indeed if the paper has brought us to realize that. And, of course, that is linked very closely indeed with the need for fundamental research. I recognize in the audience certain representatives of the Ministry of Agriculture. I see how extraordinarily well they have taken his mild criticisms. But if one may say so, I fear it is the case that the research work which is so important, and so badly needed, is not always appreciated in a Government department, for the simple reason that it does tend to upset the nicely established administrative procedure for the carrying out of the statutory requirements of an existing Act. Town and country planning in this country is still so young that we still have a lot to learn and we must be flexible.

In the Scott Report we formulated for the first time a great deal of general public opinion. Some of the major recommendations in that Report as to procedure were not put into operation, and I will go so far as to say, speaking as Vice-Chairman of the Scott Committee, and knowing Lord Justice Scott's own viewpoint, that things have not been going according to the plan visualized by the members of the

Committee. I hope that perhaps those who have already made up their minds, before starting their research, that the Scott Report is wrong, will bear that in mind.

Dr. Wibberley referred briefly to the fact that I was talking a few nights ago to the Soil Association about an attempt to measure the differences in land by the concept of the Potential Production Unit. I think this dovetails with what he has been saying to-day, and we would both agree, I think, that we must tell our friends in the N.F.U. and elsewhere that there is bound to be a continued transfer of land from the one important use of food-production to other important uses, and that that has to be faced. I suggested that by up-grading of land, we could increase the potential production units from 27,700,000 million to something like 37 million, a 30 per cent increase. There must be a loss of rural land; that we are agreed upon, but there can be, and must be, a replacement from other parts of the land.

I am wondering whether we can look at the Ministry with which the lecturer and I have both been connected for a real lead. Where are the results of the tremendous work done under the auspices of the Agricultural Research Council, turned out by our agricultural research stations—and other bodies of the same sort—and the efforts made towards application by the N.A.A.S.? I do not think we have yet got the answer as to how research results can be tried out on a large scale. I did not intend to refer to the garden controversy, but, having been intrigued by what I thought was rather a wild statement in a certain book, in the dark days of the war in 1942, I went round my little home town in Cornwall and with a six-foot rod I asked people's permission to go in their gardens and measure them up. I did the same thing in Hampstead Garden suburb when staying with a certain Ministry official; I even counted his onions and I little thought of the controversy which would arise.

I have no doubt that the important paper we have heard to-day will live in the annals of the Royal Society of Arts. I thank Dr. Wibberley very much indeed, on behalf of the audience and the Society.

The vote of thanks was carried with acclamation, and the meeting then ended.

SAFETY IN SHIPS

Thomas Gray Memorial Lecture by

CAPTAIN J. P. THOMSON, O.B.E.

*A Warden, and Chairman of the Technical Committee,
Honourable Company of Master Mariners, delivered
on Wednesday, 10th March, 1954, with Captain L. G.
Garbett, C.B.E., R.N. (Retd.), Chairman of the
Thomas Gray Memorial Committee, in the Chair*

THE CHAIRMAN: The lecture this afternoon is held under the auspices of the Thomas Gray Memorial Trust, which is administered by the Royal Society of Arts and has for its objects the advancement of science and navigation and the promotion of scientific and educational interests in the British Merchant Navy. The trust was founded in 1925 by Mr. T. L. Gray in memory of his father, Thomas Gray, who was an Assistant Secretary of the Board of Trade and head of the Marine Department for a number of years throughout the 'seventies and 'eighties of the last century, just at the time, of course, when British shipping was developing very fast. He was a very vigorous and forceful man, and he had a tremendous interest in shipping and navigation. The rules of the road were formulated to a great extent under his superintendence and every sailor is familiar with the rules in rhyme of which he was the author.

The Thomas Gray Trust gives grants each year for educational activities in connection with training for the Merchant Navy; it also offers a prize for an essay and a prize of £50 most years for a deed of outstanding professional merit performed by a member of the Merchant Navy. Also, it has been the practice of the Trust to give a lecture from time to time. The first lecture was delivered in 1930 and was entitled 'Aids to Navigation'. We had one last year on the rolling of ships, and this afternoon our lecture is on the safety of ships—a subject which must be of great interest to everyone, especially seamen; of interest, indeed, to all those who go down to the sea in ships.

The lecture for this afternoon was prepared by the Honourable Company of Master Mariners, and my Committee is greatly indebted to them for its preparation. I understand that it was put in the hands of the Technical Committee of the Honourable Company, of which our lecturer, Captain Thomson, is Chairman.

It gives me great pleasure to introduce Captain Thomson, who probably is known to a good many of you already. He is a Warden of the Honourable Company of Master Mariners. He has spent forty years in the Eagle Oil and Shipping Company, during sixteen of which he commanded deep sea tankers. He was Marine Superintendent of the company from 1934 to 1951—a very fine record, you will agree, of service to the sea, and one which fully qualifies him to give this lecture.

The following lecture, which was illustrated with a film, was then delivered:

THE LECTURE

I am most grateful to Captain Garbett for his kind and encouraging remarks, but I assure you that I am more than conscious of my limitations. In their contributions to the science of navigation and safety at sea the names of the

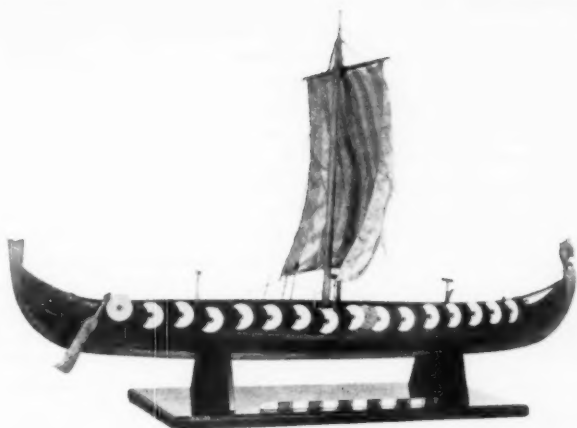
Royal Society of Arts and Thomas Gray are known on board British ships on the Seven Seas. I am sure that the Master, Wardens, and Members of the Honourable Company of Master Mariners would like me to say that we consider it an honour to be asked to deliver this lecture.

HISTORY

We can go very far back into the mists of antiquity and find records of ships and man's ingenuity in harnessing the elements in his favour. It is said that an amphora, of date about 6,000 B.C., showed even in those early days that a mast and sail had become a distinct feature: a mast and sail was required for propulsion and the safety of ships, just as machinery to-day. Although nearly all the records of early time were found in Egypt, yet it is likely that Crete had ships on the Mediterranean before the Egyptians. The Prophet Ezekiel, writing in *Ezekiel* xxvii, comments upon Tyre and Sidon, her position, her ships, material, builders, caulkers and mariners. It is therefore well supported by proof that even at this early period, over 2,500 years ago, the best materials and workmen then available were chosen to build a ship, and that the pilots and mariners were well selected, showing us that the Phœnicians appreciated the risk and chose their seamen carefully for the safety of their ships.

Starting with the fall of Tyre in 331 B.C., there is a period of about a thousand years in which the shape of ships stayed much as it was, and when apparently ships were only thought to be a mere means of carrying goods, and not too safe at that. Thus the eastern part of the Mediterranean saw the beginning of ships and their early growth the Greeks and Romans developed them.

The growth of the ship in the north of Europe was, for many reasons, much later than that in the Mediterranean. Perhaps one of the earliest was found at Nydam, Denmark, in 1863, and was probably built about A.D. 200-300. She was 76 feet long, 11 feet wide, 4 feet deep amidships and 10 feet deep at the stern. These are fair proportions, although the depth amidships to beam ratio would be improved upon to-day. It is clear from the picture that the value of sheer in improving sea-going qualities was apparent in those early days. The Vikings had settled in Iceland and Greenland by 1000 A.D., and in 1002 they landed a colony of 160 men and some women in Maine or Nova Scotia. Their ships were better designed and constructed to stand up to the weather of the Atlantic and North Sea than those of the Mediterranean. The ships of Columbus, in 1492, Vasco Da Gama in 1498, Magellan in 1519, and Drake in 1577, had not improved very much, and it seems that in those days it was not so much the safety of ships and men which mattered, but rather the urge for conquest, fresh discoveries and the desire to complete the venture. Magellan sailed in 1519 with five ships and 280 men, and the venture was completed in 1522 when the *Vitoria*, under Captain Sebastian del Coño, returned to Seville with only 31 of the original men remaining. One ship, the *Santiago*, was lost on a reef 70 miles south of Santa Cruz; another of his ships, the *San Antonio*—Captain Estevan Gomez—mutinied one night off Cape Froward and ran back to Spain,



(Crown copyright: from an exhibit in the Science Museum)

Viking ship (circa A.D. 900)

leaving him with three ships, the *Vitoria*, *Trinidad* and *Concepcion*, which continued the voyage. Magellan took 38 days from Cape Virgins to Cabo Deseado (near Cape Pillar) and 98 days to the Philippines, where he was killed by the natives. I do not wonder one of his ships mutinied and ran back from Cape Froward, as the weather conditions in this locality can be such as would shake the stoutest hearts, even in a ship of to-day, let alone those of Magellan's day.

The Corporations of Trinity House, Deptford, Hull and Newcastle, originated well before the sixteenth century, the first charters being granted by Henry VIII and confirmed by Edward VI in 1547, by Queen Mary in 1553 and Queen Elizabeth in 1558, in the first year of their respective reigns. These Corporations very early in their history established in the United Kingdom a great service to seamen and ships in the provision of lights, beacons and buoys to mark dangers, a pilotage service, Assessors to the Admiralty Courts and other services. Trinity House, under its Masters, Wardens and Elder Brethren, has continued its great work to this day.

So down through the years. It was King Charles I in about 1646 who separated the Royal Navy from the Merchant Navy, and King Charles II who helped the Merchant Navy by forming the Board of Trade and by the Navigation Laws of 1666. During the seventeenth century ships increased in size, and one Sir Anthony Deane, who became Master Shipwright to the Navy in 1667, did much for naval architecture. Pepys said, 'Mr. Deane did discourse with me his ship *Rupert*, which succeeded so well as he had great honour and recommendations by it, and then fell to explain to me the manner of casting the draft of water which a ship will draw beforehand, which is a secret the King and all admire

in him and he is the first that hath come to any certainty beforehand of forecasting the draft of water of a ship before she is launched'. These calculations, probably first introduced by Sir Anthony Deane, have been added to through the years and amplified in such a manner as to be applicable to a ship under every possible condition. It is the regular routine of the Ship's Officer to calculate drafts for all sea conditions, loading and discharging both for trim and stability; also these calculations are often made in the Marine Superintendent's Office before a special cargo is booked, thus ensuring good stowage and safety.

So man's efforts, impelled by the urge for venture and fresh discoveries, come down through the ages. In 1765 the marine chronometer came into being through the genius of Mr. John Harrison, its inventor and maker. He was to receive a reward of £20,000 offered by the Government for a time keeper which would keep Greenwich time within certain limits and thus facilitate the calculations for longitude at sea. His chronometer more than filled the requirements and soon proved its worth. The result was that a chronometer soon became part of the equipment on every deep-water ship. The laborious lunar calculations for longitude continued for some time, mainly perhaps as a rough check to the chronometer, but they have long since disappeared from the Ministry of Transport examinations.

Early in the nineteenth century the marine engine was invented and the development of marine propulsion since the *Comet* of 1811 could be the subject of many lectures. Machinery has been a major contribution to efficiency and safety in ships. The risk of a lee shore which faced the mariner in the days of sail no longer exists, and it is shown by the records with the years propelling machinery becomes more efficient and reliable. In 1845 the Certificates of Competency for Masters and Mates were instituted, and in 1850 they became compulsory. Certificates of service were granted to serving masters and mates. In 1863 Certificates of Competency for Engineer Officers were instituted.



(Crown copyright: from an exhibit in the Science Museum)

P.S. Comet (1811): the first steamboat to run commercially in Europe

This being the bicentenary year of the Royal Society of Arts, it may be opportune to look back on safety in ships through the last century—to look astern, as it were, and see what has been done to promote safety in a hundred years. One hundred years ago the Merchant Shipping Act of 1854 was passed. This Act changed tonnage measurement with a view to improving the form of ships. It had been appreciated that shipwrecks and loss of life were a serious matter and the cause was thought to be a bad form of ship and faulty ship-builders. The question of overloading does not seem to have been believed to be dangerous, and it seems that the question of proper loading was left to the Master: in fact, and in law, it is still the case to-day that the Master is responsible for the proper loading, although the weight of cargo he may carry is fixed by a loadline.

In 1774 the load line draft of ships was given in a list produced by Lloyd's Coffee House. The practice continued until 1834, when Lloyd's Register became a separate society from the underwriters of Lloyd's. In 1835 the Committee of Lloyd's Underwriters proposed, as a guide to safe loading, that the freeboard should be set down on each side of the ship amidships, the amount of free-side from the deck being a quarter of the depth of hold of the vessel. This rule proved a good guide, but experience proved it to be lacking in some ways as it did not allow for the different types and sizes of ships. It was, however, a move in the right direction, being based on the practice of good sailing ship masters of those days. The times were difficult and by 1860 the clipper ship was growing in favour and steamers were beginning to increase in number.

The Board of Trade's attention was drawn to the excessive loss of ships by the Newcastle Chamber of Commerce, who considered that the main causes of losses were improper equipment and unseaworthy conditions, as well as the incompetence and carelessness of those in command. It was said in 1867 that, as the result of the large increase in casualties, the rate of insurance was double what it was twenty to thirty years previously, and this while ships were being built stronger than ever. A report sent in 1870 to the Associated Chamber of Commerce in London by Mr. James Hall of Tynemouth, a ship owner, gave several instances of overloading and said 'the wonder is not that so many ships are lost, but that the number is so few'. The report was adopted and sent to the Board of Trade, which asked the Government to consider the question of a maximum loadline for sailing and steam ships. In the same year the Institution of Naval Architects sent to Parliament a report which they had drawn up, basing the freeboard on the breadth with an allowance for length, but the report made no mention of depth.

The year 1870 saw further activities. Samuel Plimsoll, M.P. for Derby, interested himself in the question, making use of Mr. Hall's work and the facts he had put together, and he met with such success that the seamen to this day call the loadline the Plimsoll mark and have not heard of the name of James Hall. In 1870 also, Lloyd's Register first fixed the loadlines for a particular type of ship, but there were difficulties with certain types of ships which led to the Society suspending the vessel unless the owners agreed to a certain loadline.

In 1871 a Merchant Shipping Code Bill was introduced which stated that the draft of water should be shown at the bow and stern, and put on record. Officers of the Board of Trade were required to prevent ships from going to sea if they considered any defect made the vessel unseaworthy. The Bill, however, was not passed before 1873, and gave the Board of Trade Officers power to detain overloaded or improperly loaded vessels. The working of this Bill led to endless problems: the matter was constantly raised in the House of Commons and a Royal Commission on unseaworthy ships was appointed. This was followed by the Merchant Shipping Act of 1875, which required improved markings of loadlines and deck lines; the Act also required the freeboard to be written into the agreement with the crew (Articles Form Eng. 2). The same Act also dealt with the stowage of cargo of the nature of grain which required shifting boards or some other means to prevent a shift of cargo. The Act was passed for one year, but it was carried again in 1876.

The rules still presented difficulties, and the Board of Trade called a conference with Lloyd's Register and the Liverpool Registry and, although agreement on the amount of freeboard was not reached, it was concluded that such measurement should take into account: (1) the construction and strength of the ship; (2) the ratio of the enclosed space above the water line to that below; (3) the form and proportions as well as the sheer of the deck; (4) the strength of the deck fittings; and, (5) the height of the platform or height of the weather deck above the water. The proposal was based on the ratio of the buoyant space above water to that below, while the first condition (of strength) was obtained when the vessel was built to Lloyd's rules.

Lloyd's Register continued their work for ten years and in 1882 they issued tables for the freeboard of all kinds of vessels, and it was suggested that these might be used by owners who wished to do so. This idea was welcomed, and by 1890 some 2,200 ships had been marked by Lloyd's Register. In the intervening years between 1870 and 1890 the matter was almost continuously in hand, the Board of Trade and Lloyd's Register doing a great deal of useful work. In 1890 the first Load-Line Bill was passed and became part of the Merchant Shipping Act of this country. The strength was fixed on the 1885 rule of Lloyd's Register, and freeboards could be marked by the Board of Trade and Lloyd's Register as well as the British Corporation and the Bureau Veritas. These rules of 1890 represented the best sea practice of about the period 1872 to 1882, and it is important not to forget that the increase of safety which has occurred particularly since 1890 is in some part due to having a loadline.

In 1894 the Merchant Shipping Act (57 and 58 Vict. Ch. 60) in seven hundred and forty sections became law. It is a most comprehensive treatise. Enactments and repeals have been introduced during the past sixty years and it is suggested that further amendments and consolidation are now overdue. I think I am safe in saying that it is the best guide in existence on maritime statutory matters and a good friend to the young ship master. Sections 464 to 491 deal with Special Shipping Inquiries and Courts; their jurisdiction is such that it extends to every quarter of the globe in which British ships and seamen may be found, and may



The four-masted barque Pamir, 3101 tons gross, a veteran of the last days of sail, coming up channel in 1947 from New Zealand to London via the Horn, with a full cargo of grain and sailed by a New Zealand crew

be exercised on the high seas and in places abroad where no other British Courts have power to function. They are primarily administrative courts of inquiry, created to assist the Board of Trade in their duty of preserving a reasonable standard of safety of life and property at sea. They owe their origin to the Mercantile Marine Act of 1850 and have therefore been in existence doing good work for more than a hundred years. In the course of the years between 1850 and 1930 some 8,000 inquiries were held. The courts are not criminal courts but tribunals to find out exactly what happened.

No ship is too small or too large to be considered if the circumstances merit it. Generally, the court makes recommendations to prevent a recurrence. The reports of court findings are circulated in shipping circles and may be obtained from all H.M. Stationery Offices. These inquiries, and the publicity given to the findings, have been a great asset to the shipping industry.

In earlier days at sea the carriage of dangerous goods and explosives in ships could well have been much debated. This is easily understood, as Sections 446 to 450 of the Merchant Shipping Act, 1894, had not been preceded by any other Board of Trade instructions. Section 446 made it an offence to carry dangerous goods without distinctly marking their nature on the outside of the packages, and rendered the offender liable to a fine not exceeding £100. Section 447 made it an offence to ship dangerous goods under a false description

on board any ship, British or foreign, and rendered the offender liable to a fine. Section 448 gave the Master the right to refuse to take on board any packages or parcels suspected of containing dangerous goods, and the right to require them to be opened to ascertain the facts. Section 449 made provision for dangerous goods on board a British or foreign ship improperly sent or carried to be forfeited.

As time went on more and more dangerous goods and explosives were developed and appeared for shipment both in this country and abroad, 'no objection being raised so long as they are packed to comply with the Order of the Secretary of State, are enclosed in a substantial magazine or compartment and are surrounded by non-inflammable goods'. In later years, however, it may be said that science has produced many grades of dangerous goods, notable among them being the products of the petroleum technologist. Further guidance was needed by the shipper and the mariner, and the Ministry of Transport, being fully aware of the necessity, have published the report of the Departmental Committee appointed to consider the existing rules. The report has now been printed and issued in a most suitable manner, comprising 218 pages in ten sections with a comprehensive index making it an excellent reference book. A copy of this report should be available to the officers on all vessels. The young officer cannot afford to neglect the reading of this most instructive publication; it will save him many headaches in the years which lie ahead.

The Board of Trade in 1898 called together a small committee, formed of representatives of themselves and of the registration societies, to add to the rules of 1885 the requirements of special types, such as the turret ship, and brought in a rule for more freeboard for ships under 330 feet in length. Germany had brought out her freeboard rules in 1903, giving less freeboard in some respects than the British tables, and this resulted in the appointment in 1906 of a similar committee to that of 1898 to consider the position once more. This committee made some reductions in freeboard which remained a subject of public debate for some time. The effects of the reduction of freeboard of 1906 were examined in 1913 by: (a) comparing casualties both before and after the change; (b) considering the details of particular casualties; and, (c) hearing the experience of ship owners, masters and crew, as well as the registration societies who fixed the freeboard. The result of the committee's investigation was that the revision of 1906 could not be regarded as having increased losses.

This was the position in 1913 when another loadline committee was appointed. The loss of the *Titanic* in April, 1912, brought about a convention in London, in November, 1913, of representatives of the principal maritime countries, by which certain rules for safety at sea were agreed. This convention dealt with subdivision, lifeboats for all, and ice patrols in the North Atlantic, but it confined itself almost entirely to passenger ships. At that time the Board of Trade felt that the freeboard rules could be put into a form more suitable for international use. Owing to the outbreak of the First World War the Convention was not adopted internationally, although Britain adopted its main provisions.

With some alterations, the freeboards of 1930 were much the same as those of 1880 and, although the international Convention of July, 1930, made some

changes, for ordinary cargo vessels the practice of former days is still maintained.

It may be of interest to give a few of the Acts and reports issued between 1909 and 1954 by the Board of Trade and Ministry of Transport, all of which have contributed to safety in ships.

- 1909. Conference with other countries who adopted, as their loadline rules, practically the corrected British Tables of 1906.
- 1916. Board of Trade loadline committee issued modifications to the regulations and suggested a basis for reference to an International Conference.
- 1922. Oil on Navigable Waters Act passed.
- 1924. Carriage of Goods by Sea Act passed.
Report of Loadlines (Zone) Committee issued.
- 1925. Coastguard Act, which transferred the coastguard to the Board of Trade.
- 1929. Report of Loadline Committee issued.
Report of the Board of Trade Merchant Shipping Advisory Committee issued on the question of overloading of ships.
- 1930. Report of International Loadline Convention respecting loadlines issued.
- 1932. Merchant Shipping Act embodying the international loadline passed.
- 1933. Merchant Shipping Safety and Loadlines Convention Act came into force 1st January, 1933.
- 1952. The Merchant Shipping Construction Rules, 1952, No. 1948.
The Merchant Shipping Lifesaving Appliances Rules, 1952, No. 1949.
The Merchant Shipping Fire Appliances Rules, 1952, No. 1950.
The Merchant Shipping Safety Pilot Ladders Rule 1952, No. 1952.
- 1954. The Merchant Shipping Crew Accommodation Rule, 1953, No. 1036.

The regulations for preventing collisions at sea came into operation in 1863. Certain rules of navigation had, for a long time, been more or less generally recognized in practice, but from 1863 these regulations became compulsory upon British ships and were subsequently adopted by every maritime nation of any importance. Additions and amendments to the Articles have taken place through the decades; the latest was in 1948, and came into operation on 1st January, 1954.

SEAWORTHINESS

Seaworthiness is a wide term and embodies many features. First, the strength of the structure should be sufficient to stand not only the stresses which come upon it by sagging and hogging—that is, when the ship is suspended by a wave at each end or by one wave amidships—but by the heave and pitch of the seas, which cause shudders to pass through the vessel, and also those that come upon it by vibration set up by the propelling and auxiliary machinery.

After many years of careful study the Committee of Lloyd's Register introduced the now well-known Lloyd's numbers for regulating scantlings. $B + D$ was termed the transverse number and regulated the frame spacing and scantlings of floors and, considered in association with (d) , regulated the scantlings of frames, reverse frames and web frames. $L \times (B + D)$ regulated the scantlings of keel, stem, stern post, side and bottom plating, double bottoms, side stringers, keelsons, lower deck stringer plates and lower deck plating and, considered in

association with the proportions of the vessel, regulated the thickness of side plating and deck plating of upper, awning or shelter decks and of long erections, B regulated the number of keelsons; (d) regulated the number of side stringers. The length of amidship beams, considered in association with the numbers of rows of pillars, regulated the scantlings of the beams.

With scientific development such a simple method of laying down structural requirements became insufficient and, in order to give in tabular form scantlings that would prove adequate in service and at the same time not be excessively heavy, the basis has been changed and the scantlings for the wide range of sizes and types of ships in existence to-day are laid out in numerous detailed tables. These scantlings in the tables are related in general to basic dimensions and, where necessary, to a basic moulded draft (that is, certain lengths and breadths of ship).

In recent years cases of major and minor structural failures have attracted attention and, as the result, the Classification Societies have investigated and done a great deal of research work. Although it was found that these failures were not due to one cause alone, the conclusion was drawn that the major contributory cause was the change over from riveted to welded construction. These failures had not been confined to one class but had been more numerous in certain types, mainly in ships built abroad during the war years. Lloyd's Register, in conjunction with other classification societies, have taken steps to guard against these structural failures.

STABILITY

(A film on the subject, provided by Commander Israel, was shown at this point.)

Stability may be defined as the power which a ship possesses to return to the upright if inclined by an external cause. Ships at sea are subject to heeling forces, such as the effect of wave motion, wind pressure, ingress of water, shifting cargo, and internal free liquid surfaces. The naval architect aims at designing the ship so that she can resist the heeling forces. Factors in the design which contribute to the ship's resistance to heeling include: low centre of gravity, good beam, good freeboard including watertight superstructures and sheer, limiting the size (mainly breadth) of tanks intended for carrying liquids and, as far as practicable, designing the holds so that cargo cannot shift.

During the sailing ship era the assessment of stability was mainly a matter of trial and error. The stability had to be substantial to ensure that the ship could carry her canvas. Methods for ascertaining the stability of ships by calculation, measurements and inclining tests, have been known to shipbuilders and naval architects for many years, but notwithstanding that knowledge the stability of a large proportion of the steamers which replaced the sailing ships was handled on the old trial and error principle. If the shipbuilder carried out the necessary tests for assessing the stability, the information was not passed on to the shipmaster, and even as recently as thirty years ago it was the exception rather than the rule to find information on board ships whereby the stability under varying conditions of loading and ballasting could be determined other than by trial and error.

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SAFETY IN SHIPS

In 1928 the Board of Trade took the matter up with shipowners and shipbuilders, and it was agreed that all new British ships built in United Kingdom yards should be put through an inclining test and the stability information be passed on to the Master. The agreement was a voluntary one, and as the data to be supplied was not defined, owners differed in their views as to what information should be supplied to the shipmaster.

The 1948 International Convention on Safety of Life at Sea carried the matter further, and laid down that ships shall be inclined on their completion and the elements of their stability determined, and that the master shall be supplied with such information on the subject as is necessary to permit efficient handling of the ship. The Merchant Shipping Act of July, 1949, giving effect to the provisions of the Convention, empowers the Minister of Transport to make rules concerning the information to be supplied to the Master regarding the ship's stability. The Ministry of Transport issued comprehensive rules in November, 1952, defining the information which must be supplied to the Master, and with that at his disposal the shipmaster should be able to deal with all stability problems as they arise in service.

SUPERVISION AND CLASSIFICATION

The ship of to-day is built under the supervision of the classification and owners' surveyors and, in order to retain its class, a survey must be held every four years, subject to a limited period of grace. The question of the strength of the structure, provided maintenance and surveys have been kept to the required standard, the cargo secured and stowed reasonably symmetrically, may be taken as in order. There are, however, other features, particularly on deck, the securing of which requires the special attention of the deck officer, such as hatches, hatch covers, tarpaulins, battens, cleats and wedges, ventilators, scuttles, sounding pipes, steam pipes, doors and ports in the superstructure; doors and openings to the 'tween decks, scuppers and freeing ports should be of adequate dimensions. Losses through defects of one or more of these have occurred and have been the subject of additions to the rules for freeboard survey requirements under the Merchant Shipping Acts. The list is now a formidable one. The freeboard certificate is granted after inspection by the Classification Society or the Ministry of Transport or both, and is normally for a period of five years. The ship is inspected and the certificate endorsed annually by a surveyor for the assigning authority.

SUBDIVISION

Mention should have been made perhaps earlier of the important contribution to safety more by subdivision, that is, by transverse bulkheads, and by the fitting of double bottoms, which were first introduced in the Tyne-to-London colliers about the middle of the last century. It soon became standard practice to build these into the structure of all sea-going vessels.

The double bottom in all sizable cargo and passenger vessels extends from the afterpeak bulkhead to the forepeak bulkhead. It is divided into tanks

of a total capacity which, together with the forepeak and afterpeak tanks, enables a ship to make a normal sea passage without recourse to the use of dry ballast, thus saving time and expense. Also, as the name implies, they provide additional safety in a double bottom for about 90 per cent of the vessel's length, and the remaining 10 per cent of length is taken up by forepeak and afterpeak tanks, which are usually fitted with a tank top providing double skin for perhaps the most vulnerable spot of the vessel's construction. These tanks may also be used for trimming purposes, and for assisting the stability of a ship when loaded with a light cargo, such as timber or bales. They also provide a level platform, better stowage and safer transport of cargo. Subdivision of a cargo ship must, of necessity, have some relation to the trade in which the vessel is engaged and to the length of the merchandise carried. Experience has shown that ships carrying general cargo require at least 80 feet between transverse bulkheads in one hold. In the sailing ship only one transverse watertight bulkhead was fitted forward.

The risk of fire in steamers led to the fitting of two further watertight bulkheads to divide the machinery space from the cargo holds, so that if the ships were flooded by any cause in the cargo spaces, there was still a chance of working the engines. All steamers, therefore, have a minimum of four bulkheads which may be reduced to three if the engines are placed aft. This applies, of course, to a comparatively small ship; a ship of 285 feet would have an additional watertight bulkhead, and as the ship increases in length more would be fitted.

The foregoing applies to cargo vessels' subdivision, and it would require a very long paper to give all the factors concerning the floodability of the compartments and safety measures required for passenger vessels. The subdivision is required to be such that they will be able to remain afloat with either one, two or three adjacent compartments flooded, the higher standard being for vessels which are predominantly passenger carriers.

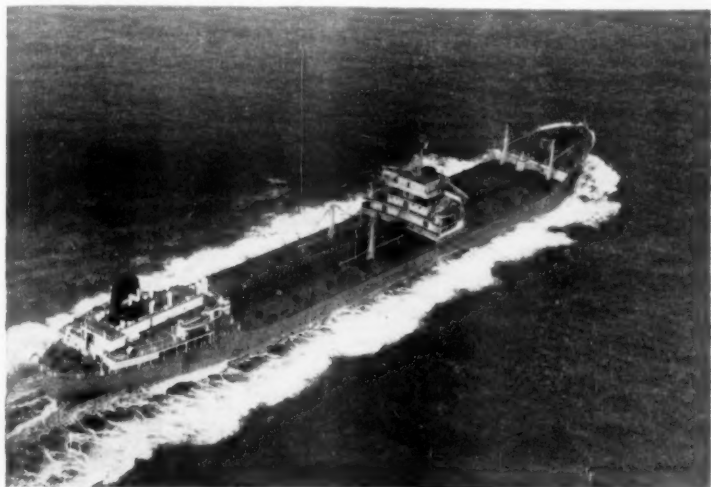
For the purpose of the Safety Rules made by the Ministry of Transport for giving effect to the requirements of the 1948 International Convention for Safety of Life at Sea, passenger vessels are arranged in classes ranging from Class I, engaged in long international voyages, to Class VI (a), carrying not more than 50 passengers for short distances near the land.

The greatest advantage in subdivision is perhaps seen in a tanker where a vessel of, say, 460 feet might have as many as 17 transverse bulkheads and two continuous longitudinal bulkheads. The tanks are, of course, part of the structure of the ship and extend over 75 per cent of the length of the ship. There are also double bottoms under the machinery spaces and a deep tank under the forehold. The construction is a near approach to an unsinkable ship, the weak spot in this design being that the engine room is situated aft. It is normally about 20 per cent of the length of the ship. If, therefore, the engine room were holed and flooded while the vessel was loaded with heavy fuel, there would be such an enormous tipping lever as to bring her stern under water. When loaded with a gasoline cargo at 50 to 52 cubic feet a ton she would remain afloat so long as the bulkheads held. Experience has shown that when in ballast a tanker will take a great deal of punishment before she will sink.

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SAFETY IN SHIPS

I know of a case of a 12,000 ton dead weight tanker 460 feet by 61.00 feet by 33.3 feet which, whilst on passage in mid Indian ocean from Australia to the Persian Gulf, was torpedoed in the engine room and in the cargo tanks, and was shelled and set on fire. The crew had to abandon the ship and she was believed to be sunk but six years later she was found ashore on an isolated island. Inspection revealed a draft of about 18 feet forward and 21 feet aft. She was upright, but damaged beyond repair. What the enemy had done to her, plus the effects of the elements for six years drawing her backwards and forwards, had failed to effect her destruction, and this demonstrates the advantage of subdivision and safety in this class of ship. It also brings out the high class of workmanship put into the ship's construction.*



A modern tanker: the World Enterprise, 33,000 tons

SHEER

Sheer has been an important contribution to safety of ships from the very earliest days; the smaller the ship, the more necessity for sheer. Open boats owe their safety at sea to sheer, but to-day there is a tendency in large new construction to build a parallel hull, adding a forecastle and poop as a substitute.

* Since the lecture, I have learnt that the time the ship drifted was far less than six years. The ship was torpedoed in June, 1943, and grounded in November of the same year. The reason why information of the grounding never reached the owners until six years later was due to the fact that the place where she grounded was remote and under enemy occupation. This does not affect the point at issue. J. T. THOMSON.

This can only be regarded as a secondary adoption, perhaps suitable to ships with a large freeboard trading in fine weather. For general and world-wide traders the sheer should be retained. It provides drier decks and lessens the risk of damage, and also enables the fast ship, when fully loaded, to maintain a more satisfactory speed in bad weather conditions. I could quote examples of my experience and comparisons in the different types at sea, but one does not need to go further than the Thames Embankment during a strong wind against the tide to see tugs towing barges of the parallel construction and also swim-ended barges, which have a good sheer. The latter craft tow with dry decks and added safety and comfort, whereas the former, with a greater loaded freeboard, are wet and uncomfortable.

TABLE I. CASUALTY RETURNS, ANNUAL SUMMARY, 1953

Casualties to motor and steam vessels of 500 tons gross register and upwards, which have been posted in the Loss Book during the year 1953.

Nature of Casualty	British Commonwealth				Foreign				Totals		
	Motor		Steam		Motor		Steam		Totals		
	Total Loss	Partial Loss	Total Loss	Partial Loss	Total Loss	Partial Loss	Total Loss	Partial Loss	Total Losses	Partial Losses	Total
Weather damage ...	—	96	—	203	1	116	—	525	1	940	941
Foundering and abandonments	1	—	1	—	6	—	7	—	15	—	15
Strandings ...	2	93	4	198	5	210	27	546	38	1,047	1,085
Collisions ...	1	164	1	389	4	353	12	639	18	1,545	1,563
Fires and Explosions	1	45	1	91	5	91	2	125	9	352	361
Missing ...	—	—	1	—	1	—	1	—	3	—	3
Damage to machinery, shafts and propellers	—	295	1	302	—	386	—	468	1	1,451	1,452
Other casualties ...	—	160	1	368	1	372	2	945	4	1,845	1,849
Totals—1953 ...	5	853	10	1,551	23	1,528	51	3,248	89	7,180	7,269
Totals—1952 ...	3	816	15	1,626	17	1,471	52	3,776	87	7,689	7,776
Totals—1951 ...	2	762	16	1,827	22	1,358	63	3,739	103	7,686	7,789
Totals—1950 ...	3	700	15	1,796	19	1,148	51	3,141	88	6,785	6,873
Mined (not included in above):	—	1	—	—	—	1	1	—	1	2	3
Totals—1953 ...	—	1	—	—	—	2	—	1	1	4	5
Totals—1952 ...	—	—	—	—	—	1	2	2	2	3	5
Totals—1951 ...	—	—	—	—	—	2	7	7	11	16	27
Totals—1950*	—	2	3	5	1	2	7	7	11	16	27

* Of these, 3 British steamers—total loss; 1 British steamer—partial loss, 1 Foreign motor vessel—total loss and 2 Foreign steamers—total loss occurred in Chinese waters.

RECENT LOSSES

The Annual Summary of Casualty Returns for 1953, published in the Lloyd's List and Shipping Gazette of the 7th January, 1954, is seen in Table I. The Liverpool Underwriters' Association has very kindly granted permission to use these figures. Table II shows the number, total gross tonnage and nationality of steam and motor vessels of 500 tons and upwards totally lost through marine causes in 1951, 1952 and 1953. The nature of the casualties is set out in Table III, giving eight specific causes classified under the heading of British Commonwealth and Foreign. The total loss over the year of 90 ships of a total gross tonnage of 341,877 might be regarded as serious, but when we consider the fact that there are over 90,000,000 tons of shipping, under the British Commonwealth flag and the foreign flag, the percentage of tonnage losses is small, amounting to 0.37 per cent. A comparison of the figures of partial loss, 7,272 cases, and the total loss of 90 shows the latter to be 1.23 per cent of the total casualties. The total figures for the three years previous are as follows: 1950, 6,900; 1951, 7,794; 1952, 7,781. The average was 7,491, and the figure for 1953 of 7,272 is an improvement on the average of the three years previous of 2.92 per cent.

TABLE II. TOTAL LOSSES BY NATIONALITY

Nationality	1953				1952				1951			
	Motor		Steam		Motor		Steam		Motor		Steam	
	No.	Tons Gross	No.	Tons Gross	No.	Tons Gross	No.	Tons Gross	No.	Tons Gross	No.	Tons Gross
British Commonwealth	5	13,555	10	60,998	3	2,904	15	39,457	2	7,127	16	44,147
Foreign:												
America, U.S.	—	—	9	63,583	5	7,373	9	63,169	3	7,048	6	43,291
Belgium	—	—	1	3,513	—	—	1	7,612	1	6,660	1	978
China	—	—	—	—	—	—	—	—	1	3,327	1	2,242
Denmark	—	—	—	—	1	1,105	1	1,806	2	9,675	2	5,203
France	1	849	2	5,194	1	709	4	18,955	1	1,662	1	1,463
Germany	1	6,367	—	—	—	—	1	1,494	—	—	2	1,351
Greece	—	—	3	13,034	—	—	7	29,966	1	835	4	18,383
Holland	3	11,674	—	—	3	1,112	1	576	1	685	—	—
Italy	1	625	2	4,929	—	—	—	—	1	512	1	2,087
Japan	1	827	6	20,037	1	789	6	9,614	2	1,617	18	23,380
Norway	1	796	2	3,309	2	9,909	—	—	5	17,450	2	8,809
Panama	—	—	6	16,897	—	—	7	23,177	2	12,668	8	26,004
Spain	—	—	2	4,325	—	—	2	5,091	—	—	7	17,773
Sweden	6	30,046	3	7,412	—	—	3	2,819	1	8,337	4	5,746
Other Countries	9	21,549	15	48,131	5	3,673	10	23,326	1	11,515	6	14,478
Totals	28	86,288	61	251,362	20	27,574	67	227,062	24	89,118	79	215,335
Mine Losses (not included in above):												
British Commonwealth	—	—	—	—	—	—	—	—	—	—	—	—
Foreign	—	—	1	4,227	1	869	—	—	—	—	2	1,799
Totals	—	—	1	4,227	1	869	—	—	—	—	2	1,799

TABLE III. NATURE OF CASUALTIES

<i>Cause of loss</i>	<i>Number of cases</i>	<i>Percentage</i>
<i>Partial losses :</i>		
Weather damage	940	13·09
Strandings	1,047	14·58
Collisions	1,545	21·51
Fire and explosions	352	4·90
Damage to machinery, shaft and propellers	1,451	20·21
Other casualties	1,845	25·69
Mines	2	0·02
Total	7,182	
<i>Total losses :</i>		
Weather damage	1	1·11
Foundering and abandonment	15	16·67
Strandings	38	42·22
Collisions	18	20·00
Fire and explosions	9	10·00
Damage to machinery, shaft and propellers	1	1·11
Other casualties	4	4·44
Mines	1	1·11
Posted missing	3	3·34
Total	90	

In the total loss figures, four stand out rather boldly; they are strandings, collisions, foundering and abandonments, and fire and explosions, and under these four headings no less than 88·88 per cent of the total losses are grouped. Strandings account for 38 and, of this number, 6 are British flag and 32 foreign flag. Collisions account for 18, of which 2 are British flag and 16 foreign flag. Of foundering and abandonments 2 are British flag and 13 foreign flag, and of fire and explosions there are 9, 2 being British flag and 7 foreign flag. The British Commonwealth losses under these four causes are 13·33 per cent of the total loss.

FIRE

Although the figures for total loss and partial loss by fire or explosion are comparatively low, we have heard a good deal about ship fires lately. The risks of fire are always more or less present on a ship, whether at sea or in port, and

one would almost venture to say that the hazards are greater in port, where the sea routine has been relaxed and the duty taken over by shore fire watchmen. Perhaps the greatest risk is when the vessel is under repair.

The Ministry of Transport Regulations require fire-fighting equipment to be readily available in every part of the ship. This includes a number of two-gallon foam extinguishers distributed round the ship, with an extra supply at vulnerable spots. These extinguishers have been effective and, in many instances, the fire has been put out before it has established a proper hold. In the course of a year there must be many instances where these units have saved a serious situation: they are on the spot and can be brought into use instantaneously. An understanding of the nature of the fire is an important factor in fighting fires. Foam is the best to use on oil fires as it floats and spreads, trapping vapour and excluding air.

WEATHER

In considering the reaction of a ship to weather, the first consideration is the weather itself and the ship's ability to stand up to it. It was long a dream of weather men to have a chain of ships across the ocean to report and observe surface weather and to take balloon soundings of the hitherto unexplored upper air. This has been achieved and in the North Atlantic there are ten such ships of different nationalities on station the year round to fill in the missing link regarding the upper air and so improve the weather forecasts. In addition to their primary duties—weather observation and air/sea rescue—these ships, by virtue of being stationary, are in the unique position of being able to study the effect of bad weather on ships, that is, they are able to study the whole cycle of events in a depression as it passes over the ships' fixed positions, however long it takes. Heights and periods of waves can be studied at all stages. In addition, there is a voluntary service of weather observation by mobile ships in all oceans, and the Air Ministry, Marine Department, receive regular reports from no less than 1,780 selected ships, 440 supplementary ships and 250 others, a total of 2,470 distributed ocean-wide on all routes. In addition, the Safety of Life at Sea Convention, 1948, makes it a requirement in emergencies or hurricanes for all ships in the area to send in reports. It will be clear that all these ships cannot be at sea at the same time, but 70 per cent might be a fair proportion returning weather reports daily, and together with the stationary ships they are doing good work for safety in ships and property afloat and ashore. Seamen through the ages have studied and regarded weather as a formidable enemy and I suppose they always will, but perhaps to-day to a lesser degree than their forefathers.

AIDS TO NAVIGATION

A paper on safety in ships would be incomplete without reference to the General Aids to Navigation. The astrolabe and magnetic compass, and their uses, were known in 1492, in the days of Columbus, but whether Columbus used the astrolabe on his four voyages to America is debatable. He certainly used a magnetic compass and kept two reckonings. A statute in 1713 (12 Anne Ch. 14) provides a public reward for such person or persons as should

discover the longitude at sea. The Commissioners for examining any such discovery were to be the Royal Astronomer at Greenwich, the Master of Trinity House, the President of the Royal Society, the Admirals of the Red, White and Blue Squadrons, the First Lord of the Admiralty, and others. I am unable to say who collected the reward, but it is apparent that if Columbus fixed his positions daily by astronomical calculations, the art had made little progress in over two hundred years.

We have come a long way since then. In the last century astronomical tables and instruments have become available to the seaman, and enable him to determine his position and error of compass by astronomical calculations using sun, moon, stars and planets. The Admiralty Survey Branch has carried out extensive surveys and to-day the Hydrographer publishes and keeps corrected to date over 7,000 charts of the world. The degree of accuracy is such that on the navigable routes no uncharted rock is known.

The Masters and Elder Brethren of Trinity House, since its inception well before the sixteenth century, have done a great service in providing lighthouses, beacons and buoys on the British coast, and their vigilance and untiring efforts have been an example and guide to other nations in making the seas as safe to navigate by night as by day.

The twentieth century has witnessed great developments in wireless telegraphy, which has gone from strength to strength in providing aids for the safety of ships. In the first place it provided W.T. distress signals for ships, then wireless time signals for checking ships' chronometers at sea, thus assuring the ships' longitude to be as correct as the latitude. This was followed by echo sounders and W.T. Direction Finders, then by Radar, Decca, Loran and Consol.

Radar has made rapid progress, coming into production during the second World War. It was soon made available to merchant ships, and to-day it has become almost a standard fitting for all new vessels and, as an aid to navigation, it contributes to safety and dispatch in no small measure.

The Decca navigator is a position finder which I think came into prominence in its contribution to safety during the Normandy beach landings. Its range is limited to a chain of transmitters. The seaman in coastal waters may fix his ship's position in about ten seconds by using a special lattice-line chart on which a pin-point intersection can be placed from a number of dials. The extreme accuracy of this device is of use not only to navigation, but also to cable ships and marine surveyors. Loran, a long-range position finding device, operates on the time base principle. A chain of transmitting stations is set up in pairs, called master and slave, about 400 miles apart. Pulses are radiated at a constant rate, and the time interval of their arrival at the ship is measured on a cathode ray tube indicator in the ship. It is capable of giving a long range fix up to 500 miles with an accuracy of three miles. Its safety value to the navigator approaching land, when astronomical fixes have been precluded by thick weather, is great. The Consol system, originally in use for U-Boats, operates on the direct bearing principle. The station is an aerial system arranged in a line which radiates a pattern of signals in dots and dashes in an anti-clockwise sequence.

Accuracy here is in counting numbers of dots and dashes to ascertain section bearing from station. For long range of Consol fixed, say, up to 500 miles, accuracy is within about five miles.

Gyro compasses came into use in merchant ships early in the twentieth century, but were regarded perhaps as an expensive luxury, and it was not until about two decades had elapsed that they became familiar on merchant vessels. By 1940 their real value had been established, and from that date onwards few sizable ships have been built which have not been provided with a gyro compass. Their use contributes to safety and economy in no small way.

CONCLUSION

The laws of safety in ships were only learned by sea adventure. It would almost seem better to speak of responsibility of sea operations than safety. In every walk in life there is a risk and without risk nothing is done. With such aids to navigation as were available in 1854 a voyage was a real adventure, even in the most seaworthy ship, but the studies of sea experience during the last hundred years have made the risk fairly well understood and the ship of to-day is built and equipped so that reliability of operation enables the work of trading to be carried out with minimum waste and maximum certainty.

It is said that risks at sea between 1890 and 1913 were reduced by 50 per cent in British ships, and that this low risk was decreased by more than half between 1913 and 1927. The casualties in British ships were again lowered in the years 1950, 1951, 1952 and 1953, and the question might be asked 'Have we reached the point of maximum efficiency and safety at sea?' The answer is 'No: we must continue to develop our efforts, always remembering certain combinations of circumstances which may defy us and may continue to defy human endeavour, and not expect absolute safety at once'.

Electronic aids to navigation have been following each other with such rapidity that it is difficult to keep pace with them, and there is a risk of these aids getting ahead of the personnel equation. It therefore becomes the ships' officers, in addition to gaining astronomical practice in navigation, which has been developed to such a high degree, to concentrate on electronic aids in order to combine the arts to the greatest interest of ships efficiency and safety at sea.

The story of seaworthiness has been written down very slowly in what might be called rules of good practice, emanating first from the sailor. The way in which safety has been brought to ships at sea could not, in any sense, be complete unless one had some idea of the brave adventures of seamen through the ages: the voyages of Hanno the Carthaginian round Africa, Columbus, Magellan, Drake, Cook and Fitzroy, and many others. The adventures which have taken place in two World Wars prove that great sea spirit exists, its tradition continues, and, if we may judge by the last war, with even greater force than before. The art of seamanship is old yet ever new; the most experienced amongst us may learn from it daily.

The ownership of British merchant ships since 1646, and perhaps before, has been with private enterprise, and many of our large shipping companies of

to-day started in a small way, and have passed through very difficult times, owing to depression, cut freights, foreign competition, strikes and wars, but nevertheless the owner has always endeavoured to specify for a new ship better than the last one.

You may very well ask how can British shipping with over 8,800 ships of a gross tonnage of 22½ million, trading in all parts of the world, be managed and safely directed. The answer is that the British shipowner is an expert at his own job, and has never been found lacking in courage and enterprise. He fully appreciates the responsibility, and with his staff he co-operates closely with the Ministry of Transport and Lloyd's Register. The Ministry and Lloyd's Register are equally co-operative.

As a nation we depend upon seaborne trade for our very existence. The safety of our ships and those who sail in them must ever be before us.

DISCUSSION

THE CHAIRMAN: I should like to ask one question. In view of the disastrous fires that have occurred in merchant ships in recent years, have the Ministry of Transport brought out any new regulations regarding them? And, if they have not done so, does the lecturer and the Honourable Company of Master Mariners feel that something should be done?

THE LECTURER: Most disastrous fires have certainly taken place within the last four years. In 1948 the new International Convention was launched, and very far-reaching rules for fire-fighting appliances were drawn up. While they have kept a close watching brief on what is going on, I think that most seamen would agree that there was no necessity for any step other than a tightening up of control when the fire had advanced to such a stage that it could not be fought by the ship's fire-fighting appliances, when the fire brigade had to be called in. We all know of ships which have turned over through too much top weight put into them. I think seamen all feel that something more should be done about that, and I am quite certain that the Ministry of Transport have the matter before them.

CAPTAIN W. H. COOMBS, C.B.E., R.N.R.: Perhaps it might be useful to say that the Ministry did publish a set of Recommendations relatively recently.

COMMODORE RICHARD HARRISON, D.S.O., R.N.R. (RETD.): The lecturer mentioned the subject of the raising of the loadline. He did not mention the two effects which were only found out afterwards by those who had advocated this terrible business of raising the loadline. One was that it increased the loading capacity of British ships by something over a million tons, I think; but what it did not do was to provide the additional million tons of cargo, so that the ship owners had to cut each others' throats for the same amount of cargo and, of course, the freights were correspondingly reduced. I do not think that the shipbuilders realized the other effect that it had, because they were encouraged by the experts to agree, against the advice and petition of the sailors not to raise the loadline. They agreed that it was quite in order, but it seriously reduced the building of ships for a considerable time: the number of new ships required was very much reduced because of the increase in the total carrying capacity. I hope that will not be lost sight of when the experts again want to raise the loadline.

There is another point which I should like to emphasize. We have looked upon the underwriters as our good friends but I am not sure that they always are. It requires two ships for a collision, but the biggest and finest and best run ship afloat can be

sunk by some carelessly run tramp flying some queer flag, where the officer of the watch may be neither certified nor reliable. Underwriters could influence or even control such dangers. I do not suppose they insure the whole of such ships but they very often insure the cargo in some of them.

The lecturer mentioned subdivisions. We know perfectly well that subdivision of a ship's construction is a real safety measure, although it is also an inconvenience. Many of us in this room will remember the horrible disaster of the *Titanic*, when a ship in an absolutely calm sea got a small hole in the bow on her first voyage and slowly sank through the night, with no hope of being saved for more than half the people on board. I think that this was due entirely to a want of sufficient subdivisions or to not having the subdivisional bulkheads high enough.

There is one other point I should like to mention. There is nowhere in the United Kingdom where the master of a ship can see an up-to-date corrected Admiralty chart without having to buy it. I think that is a most unfortunate state of affairs. Any ratepayer or layman can get any book he likes, free. I do feel that the Institute of Navigation and the Honourable Company of Master Mariners might find some solution, so that there is a place where a master of a ship can ask for chart number so-and-so and have it shown to him with the latest corrections on it.

THE LECTURER: The reduction in freeboard that took place in 1906 reduced the speed probably by half a knot and that meant extra fuel for the passage, but it was not held to have brought about any serious disaster. There were certain types of ship, such as the shelter-deck ship, which, by closing the tonnage openings to the load deck, could be loaded deeper. Scantlings were put in so that the ships would stand up to it. During the First World War we had in service tankers built on the shelter-deck principle, and those ships were loaded twenty inches deeper as a war emergency and carried about 1,500 tons more cargo. After the war we went into the question very carefully and we found that it did not make the ship any worse than she was before. She lost speed through the deeper loading, of course, but that was more than offset by the extra amount of cargo she could collect and deliver. The point about the shipbuilder is, of course, another side of the story.

Another question was asked about the *Titanic*. The *Titanic* was not holed by one small hole forward. My recollection of the inquiry is that she was very well subdivided, but the ice had ripped no less than five watertight compartments. It is true that she floated for some little time, but then she was thrown completely open. I know of a tanker in ballast that ran over a pinnacle of rock going through the Straits of Magellan, and never lost headway. She just ran over the top of it and ripped open every tank and the engine room, and down she went in about ninety minutes; she is lying there yet—an 18,000-ton tanker. So with all we can do on subdivision, the system is not infallible.

The other point was in connection with the observation of charts. That is new to me, but I think it is most interesting. It is true that a man in the street can go into any library and seek what he wants, but the sailor has not the advantage of being able to look up any chart he wants. On the other hand, I do not think that a sailor would have any difficulty in seeing a chart if he walked in to a chart agency and asked to see one.

COMMODORE HARRISON: But only if he wanted to buy it. There are many folios of charts and many places in the United Kingdom where the Admiralty do supply a complete set of charts free. In some cases they are kept up to date by some institution, but they are not available ordinarily to the public.

CAPTAIN W. H. COOMBS: I should like to know if the lecturer considers that the development of the shelter-deck ship has been progressive in respect of safety. Captain Thomson made a reference to experience in the First World War where shelter-deck ships proved seaworthy and able to withstand strain; but I think the

records in the Second World War surely would show that a great number of ships foundered after being torpedoed in the early days of the war as they lacked subdivision which would have been available if they had not been shelter-deck ships.

THE LECTURER: I quite agree that the shelter-deck ship of the type I have in mind does not have the strength that she would have if she were built to the normal lines, and there is that disadvantage of subdivision. Nevertheless, I was well acquainted with ten of this class, carrying 16,500 tons, and they were raised to something near 18,000 tons. These were all tankers. They were built forty years ago, and out of those ten tankers three are afloat and doing good service to-day. That speaks for itself. Out of those that were sunk, one, as I mentioned, ran over a rock in the Straits of Magellan and of the others, two were sunk during the first war, and two in the second; the other two have been broken up; so there is no complaint about subdivision. I think, though, that it is a point. It was a temporary measure at the time and the normal design is preferable to closing the tonnage openings and getting the additional carrying capacity in that manner.

I think the same thing, in the main, must apply to dry cargo ships: the ship is not quite so good as if she had been built as a normal carrier.

COMMANDER C. FRANKOM: I should like to say something in defence of the shelter-deck ship. As I see it, the existence of a shelter-deck, provided you adhere to the rules and secure the hatches inside that shelter-deck, provides an element of safety in itself, because a shelter-deck provides the ship with a slightly increased freeboard—though it is admittedly an artificial one. Having a shelter-deck is not very different from having a long bridge or forecastle. The only weakness of the shelter-deck, as I see it, is that it is at times rather difficult to adhere to the freeboard rules which say that the hatches inside the shelter-deck must be secured—and there is also the awkward business of the tonnage on openings which are not allowed to have any proper securing arrangements on the shelter-deck itself. But in all cases the deck below the shelter-decks is the 'strength' deck and it is the hatches which are supposed to be secured. I would rather sail in a ship with a shelter-deck where I can keep much drier and where I am higher off the water than, for example, in a tanker which can be loaded more or less down to her gunwale. Admittedly a tanker is very safe because of her tiny hatches; but, as a seaman, I like shelter-deck ships.

THE LECTURER: Would there be subdivision in that shelter-deck—subdivision bringing the bulkheads right up to the upper deck?

COMMANDER C. FRANKOM: No, I do not suggest that at all. The subdivision goes up to the top of the strength deck—all bulkheads go up to that deck. The shelter deck merely provides a little more of what one might call 'artificial freeboard', and a slight allowance is rightly given for the existence of this deck in freeboard rules.

THE LECTURER: I think we would agree with Commander Frankom on this subject, but the whole question hinges on the strength of the structures. We were talking about ships that were built to carry a certain load but we then put another 1,500 tons on top of that, so that those ships in theory did not weigh so well on the scale. But if the shelter-deck ship were to be constructed to the full scantling, and the sheer strength brought right up to the top, I think there would be something in the point that greater freeboard is desirable for dry cargo vessels.

THE CHAIRMAN: Before we end I must just say that I am not going to let my old friend, Commodore Harrison, get away with what he almost said was a dog-in-the-manger attitude of the Admiralty. I feel perfectly certain that if any master or officer of a ship went to the main door of the Admiralty and took the trouble to fill in a pass and say that he wanted to see a chart, they would be delighted to show it to him.

There is nothing left for me to do but to express on your behalf our grateful thanks to Captain Thomson for his most interesting lecture.

The vote of thanks was carried with acclamation and the meeting then ended.

GENERAL NOTES

EXHIBITIONS AT THE IMPERIAL INSTITUTE

An exhibition of the work of Commonwealth artists painting here in England is being held at the Imperial Institute, South Kensington, and will continue until 27th July.

An exhibition of Tse-Hua, Chinese finger paintings by the Singapore artist, Wu Tsai Yen, is to be held at the same place, from 9th July to 2nd August. So far as is known, this is the first exhibition and demonstration in this country, or indeed of any Western country, of a very ancient Chinese art of which to-day there are few accomplished exponents. Mr. Wu is probably the only artist in the world who paints exclusively by this method. He will be present to explain and demonstrate the technique of finger painting.

The exhibitions will be open on Mondays to Fridays, from 10 a.m. to 4.30 p.m.; on Saturdays from 10 a.m. to 5 p.m.; and on Sundays from 2.30 to 6 p.m. Admission is free.

NOTES ON BOOKS

MATHEMATICS, QUEEN AND SERVANT OF SCIENCE. By E. T. Bell. G. Bell & Sons, Ltd., London, 1952. 215

This book has been written to try and convey to the layman something of the spirit of modern mathematics. It should be mentioned at the start that a fair amount of effort will have to be made to grasp the ideas the author is trying to put over, and some slight background of sixth-form mathematics, as well as enthusiasm, would be an advantage. The book is written in a lively style, and Professor Bell has probably succeeded as well as is possible in his attempt to write a popular mathematics. Some personal bias has inevitably entered into the book, and the reviewer's main criticism is the over-emphasis on algebra and geometry while there is hardly any mention of developments in function theory and analysis.

The author opens with a general discussion of the sort of problems mathematicians deal with, and gives a brief outline of the historical development, so that one gains immediately a superficial insight into the type of development mathematics has followed. Any reader who turns to this book in the hope of learning to appreciate the 'absolute truth' of mathematics will be disappointed, for the author happily debunks any such mystical ideas, and points out that any results obtained in mathematics depend essentially on the initial postulates, which may vary according to taste (provided they are consistent).

These statements are amplified in the following eight chapters, when various types of algebra and geometry are discussed in detail. Readers may be interested to find that the ordinary school algebra and geometry are only particular cases in a vast structure which includes curious entities such as rings, lattices and matrices. Those entirely new to the wider concepts would probably be wise to skip some of the more complex-looking sections; the author will have achieved his purpose, at least in part, if the reader gets some idea of the possibilities and fascination of the subject.

Various other topics are touched on fairly briefly. These include the concept of infinity, some problems in number theory, and ideas about relativity, continuity and calculus; a short section on statistics is hardly sufficient to give a satisfactory

impression of the subject. The author ends on a somewhat confused note regarding the fundamentals of mathematics, and the reader is left wondering whether the whole structure is going to come tumbling down owing to its insecure foundations. In fact many modern mathematicians are beginning to believe that the development of mathematics is in no way affected by Gödel's theorem, which states that mathematics cannot be proved to be consistent within the framework of its postulates.

One important criticism of this book is the failure to convey the fact that a large part of pure mathematics exists and moves forward independently of any applications it may have. One feels the author is constantly trying to 'justify' pure mathematics by giving examples of its uses; in this sense 'the spirit of modern mathematics' fails to come across. However, the book is well worth reading, and the author's frequent historical references give a pleasing sense of the continuity of the development of the subject.

MONICA A. CREAMY

FROM THE JOURNAL OF 1854

VOLUME II. 7th July, 1854

The Centenary Dinner of the Society took place on Monday, 3rd July, at the Crystal Palace, Sydenham, and was attended by about 750 gentlemen. The following is an extract from the reply by the Hon. Henry Barnard of Connecticut, U.S.A., to the toast proposed by Lord Mahon to the foreign gentlemen who had been deputed by their governments to take part in the Society's Educational Exhibition.

The Hon. Henry Barnard also responded to the toast. He said,—Had not the mover of the toast which you have received so kindly taken the precaution to introduce me here with my colleagues as a foreigner, and as the representative of a distant country, I should have felt prompted, by the remembrance of the many hospitalities which I have received already in this country, and looking around as I do upon faces so familiar, and those who seem to me to be the representatives of the British race, to have commenced with addressing you as 'my fellow-citizens'. (loud cheers.) . . . My lords and gentlemen, I do not propose now to make a 4th of July oration. I beg to return you my thanks on behalf of the small state which I represent here, as forming a portion of the great confederation of American states, and to thank you for your cordial greetings. Whatever may belong to the past history of my native state in the eyes of our own nation, we feel that we are indebted to the fact that the early settlers in Connecticut were graduates of the grammar schools and universities of this country, and that we owe it to that fact, that there was incorporated into the first code of her laws this simple provision (and if there is ever to be a monument erected, and an inscription placed upon it, I trust it may be the words of that law)—'That the authorities of the towns would not allow so much barbarism to exist in their midst, as to have a single child unable to read the Holy Word of God and the good laws of his country!' (Hear, hear, and cheers.) My lord, as the humble representative of that state, I may say with some feeling of pride, that for the last 50 years there has not been found a single born native of Connecticut who could not write his name and read the laws of his country. (Hear, hear.)

Communications for the Society should be addressed to THE SECRETARY, ROYAL SOCIETY OF ARTS, 6-8 JOHN ADAM STREET, ADELPHI, LONDON, W.C.2. Telephone number: Trafalgar 2366. Telegrams: Praxiteles, Rand, London.

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